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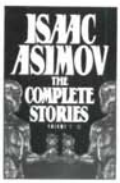

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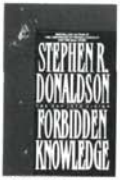

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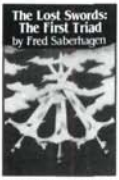

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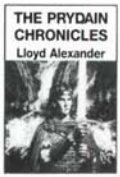

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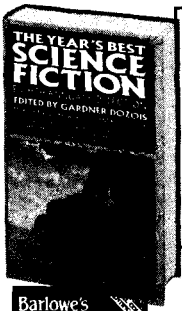

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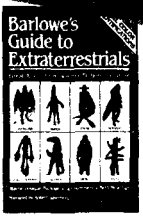

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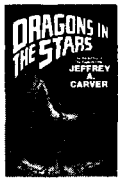

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August 1992

Next issue on sale
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Editorial

READER'S CHOICE

Stanley Schmidt

There's a fascinating irony in the tendency of some folks to equate "technology" with "dehumanizing." The irony is that many who hold such a view have not thought of it on their own, but have had it suggested to them through such media as print, radio, and television— some of the most pervasive and powerful technologies ever developed.

These technologies have, moreover, been directly responsible for exposing unprecedented numbers of people to the thinking of Shakespeare and Schiller, the music of Beethoven and the Beatles, and religions and arts of every sort. In other words, communications technologies have played a key role in disseminating the very things that people worried about dehumanization tell us are the essence of humanity.

The more they develop, the more effectively they do so. Early sound recordings, for example, were primitive and hard to use. New ones are extremely lifelike and an enormous selection is available at prices which, at least in our culture, nearly anyone can afford. Even live concerts can be heard in stereo—and watched in color—from the other side of the world. Technologies such as braille and talking books make the written word available even for the blind; closed captioning makes movie and television dialog accessible to the deaf. Easy-to-use computers and software make it easier than ever for amateurs to try their hand at writing, musical composition, or graphic arts (and take much of the drudgery out of them for professionals).

I recently found myself reflecting on such matters while my wife and I were shopping for a gift for a relative. He likes to read but his vision isn't what it

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used to be, so a large-print book seemed a perfect choice. So we went to one of those snazzy new superstores, boasting 100,000 titles in a very wide range of fields. It was a browser's paradise, for us—but when we asked where the large-print books were, we were directed to a corner containing a scant few dozen titles.

And it occurred to me then and there that this corner might well be the key to when and how electronic books become widely accepted.

They're already here, of course. Ben Bova anticipated them in his satirical novel *Cyberbooks*, but hardly had the fictional treatment appeared when the first *real* cyberbooks appeared on the market. They were primitive, of course, like the first *anything* to appear on the market. The reviews I saw said they were expensive and felt awkward to people accustomed to paper books. Some of the better reviews pointed out that both of those facts could be expected to change, just like everything else in electronics for the last several decades; but for now, recommendations were lukewarm and sales sluggish.

So far, skepticism remains widespread. A few months back, in these pages, I pointed out that one reason for resistance to the new format among adults might be the pleasant emotional associations they have built up around bound books with paper. If that was true, I hypothesized, electronic readers might never make much of a dent in the book market among present adults. But their children, growing up with similar pleasant feelings about computers, might well accept cyberbooks with open arms. The book and magazine market might go mainly electronic in some ten or twenty years, or the time it takes today's computer-literate children to grow up and become prosperous.

After my visit to the large-type department of the big bookstore, I would like to offer an alternate hypothesis: that the revolution just may be triggered not by today's kids, but by their grandparents. And *soon*, if somebody can get them thinking about it.

Consider: a good many of us, through normal aging, eventually wind up in the situation that if we're going to read books at all, we need them with large print. In the present book market, that leaves us with precious little to choose from. A significant part of the population is being cut off from the flow of

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information and entertainment available to others, solely because of a process that eventually happens to most of us.

I know this bothers many people it happens to. I get fairly frequent letters or phone calls from readers who think *Analog* has taken to using smaller type (we haven't) and want to know whether they can get a large-type edition. So far we haven't found an economically viable way to offer one, but we have at various times been available as braille or talking books. Some of those readers who have developed problems with small print, but are still far from blind, have continued to read us in one of those ways, even though the solution is more drastic than they need. Some are not willing to go that far, and simply give up in frustration on something that has been important to them throughout their lives.

Now consider this: *why should a book or magazine have to be published in a fixed typeface anyway?* That's obsolete thinking, a limitation inherited from a technology that *had* to do things that way.

The newer technologies *don't!*

I'm writing this on a computer that currently has 22 different typefaces installed and ready for immediate use. Each is available in at least half a dozen sizes and half a dozen stylistic variations. Any time I want, I can change the entire text of this document, or any part of it, to any of those combinations of font, style, and size. The whole process takes a couple of seconds, is completely reversible, and I can do it as often as I like. I could easily add other fonts if I wanted. With modern computers, it's easy.

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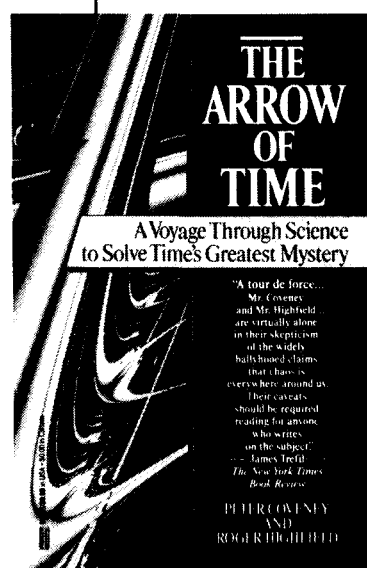
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A "cyberbook" (a term I hope will become generally accepted, and credited to Ben Bova) is essentially a very small modern computer designed to do a limited range of tasks. There's no intrinsic reason why it can't be made both as cheap and as comfortable to handle as a paperback book. And there's no intrinsic reason why its capabilities can't include letting the reader choose a typeface that his or her eyes find comfortable.

If cyberbooks become the standard way of publishing "the printed word," as compact disks have very quickly become the standard way of publishing recorded music, virtually *every* book and magazine will be available as a tiny disk to be inserted in a pocket-sized viewer. Each of those viewers will have built into it some simple way for its human user to choose the way the disk's contents are displayed.

In expensive models, for those who like to flaunt their wealth or play at being book designers, those options might include an extensive choice of fonts, sizes, and styles, and the ability to apply them to selected portions of text. Others might find such choices a mere nuisance, and prefer a simple range of magnifications to be applied at will to everything in a book. This simpler arrangement might actually be preferable for most readers in many cases, particularly if (as often happens) a book mixes several typefaces within the text. It might also be applied to graphics, acting like a variable magnifying glass, built right into the text, that a reader can use to zoom in on details of an illustration. The reader with no visual limitations, who doesn't want to be bothered with choices at all, simply uses the default settings—the ones the computer chooses unless otherwise instructed.

A wide range of readers might find some benefit in such a feature; but the *main* benefit I see in it is that it would make the entire bookstore, not just a few shelves, available to senior citizens and others with impaired vision. It would even allow for future changes in vision. If you buy a book when your vision is clear and sharp, you might like to have a lot of text on the screen at one time. Under the present page system, if your vision deteriorates so you can no longer read an old favorite book, you might as well give or throw it away. But with a cyberbook of the kind I'm describing, it can remain an old favorite. If you can no longer read it easily because the print's too fine, no problem: you just turn up the magnification and you're back in business.

A side effect with long-range benefits might be that children would enjoy playing with changing magnifications and type faces, and that might encourage their interest in books and reading. But as far as acceptance of electronic format is concerned, I think children are going to develop that anyway. Their parents will be the most resistant; their grandparents, for the reasons I've been discussing, are likely to become children's allies in demanding and thereby creating a market for electronic books and magazines. Between them, they will very probably make it happen.

Large-print paper books are a tiny

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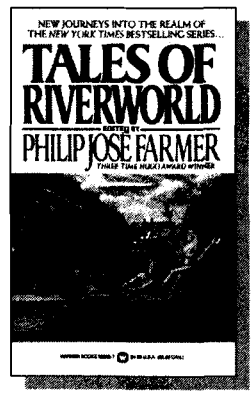
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A WORD FROM BRIAN THOMSEN

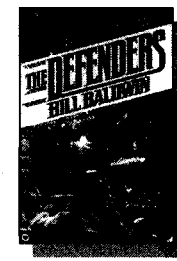
When we think of successful science fiction series many worlds come to mind, Asimov's Foundation, Herbert's Dune, McCaffrey's Pern, and who can forget Philip José Farmer's Riverworld. Through five major novels, we were treated to the epic of life along a planet-long river every-one who had ever lived was resurrected as part of some mysterious experiment.

Obviously, there are more stories to tell in this series, and more characters with exploits both major and minor. I for one am grateful that Phil has returned to Riverworld for more tales, and, who knows, someday one of the stories may feature an editor from New York City (after all, theo-retically speaking, even editors were resurrected somewhere along the banks of the River).

...and when you see me around ask me about the Top Gun pilots of the future (they're just a month away).

ALSO THIS MONTH:

THE DEFENDERS
by Bill Baldwin



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segment of the market now because nobody wants to bother with them *except* the visually impaired. Their numbers are sizable and growing, and many businesses are becoming aware of retirees as an increasingly important market. But their demand for large-print books which are nothing but large-print books will not, any time soon, account for a very large fraction of the book market. Since it's expensive to produce a small quantity of a special edition, large-print readers will continue to face a severely limited selection as long as that's how books are made.

The crucial advantage of electronic books, which I predict will play a major role in creating a market for them, is that they are not *just* large-print or small-print books. They are whichever the reader wants them to be at the moment he or she sits down to read them.

And with that choice finally left to the reader, the choices *available* to readers—even those who now have very little to choose from—will be greatly expanded. Instead of large-print books, senior citizens with fading eyesight will simply read *books*—any books—on high magnification.

And when one size *really* fits all, everybody benefits. ■

●How much easier it is to be critical than to be correct.

Benjamin Disraeli

●If a little knowledge is dangerous, where is the man who has so much as to be out of danger?

Thomas Huxley

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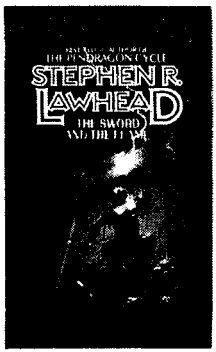

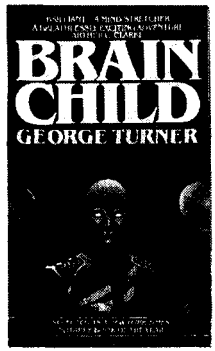

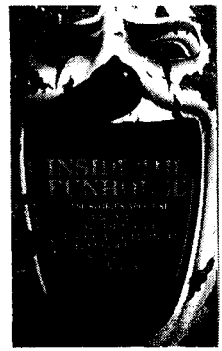

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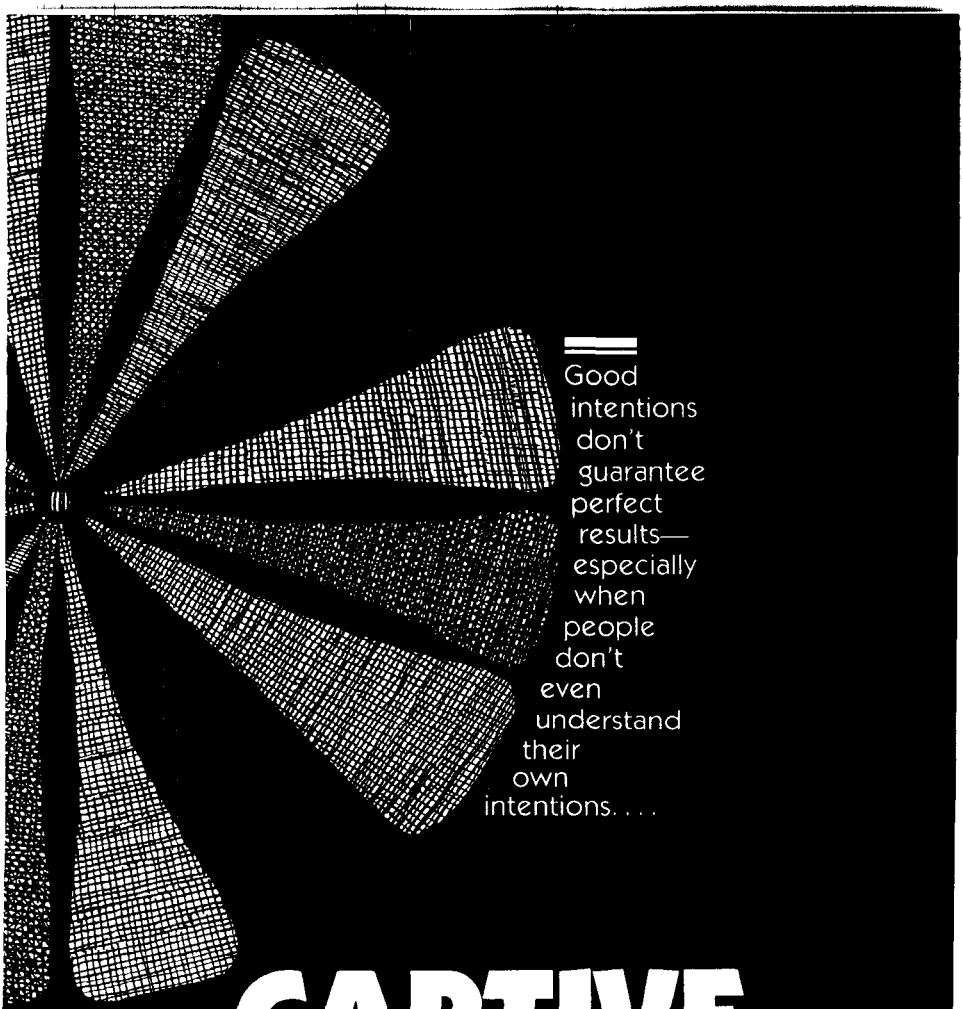

CAPTIVE DREAMS

Michael F. Flynn

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Soft and warm. Looking here, there. Duckies, Lambie-pie, pretty red Ball. I love Lambie-pie. Reaching for it. White fluffy-looking Lambie-pie soft smooth and round and Ball slipslides between the always-bars. Ethan-voice calling, "Lambie-pie." Falling bouncing, slowly, slowly, slowly. Catch Ball, he runs away. Ow! Bang the fingers on the always-bars.

Closing the eyes and waiting for the dark. See Ball resting against lamp. Hear bouncy sounds: Boing-boing-boing. Blackness! Catch the hard rod always-bars. Up, up, and swing around; and down. On the floor; hard against the feet! Quiet, quiet. Hear crib springs squeaking; duckies rattle. Open eyes and wait for light.

Brightlighthurteyes. Clumpthud. Hello, lamp. Hello, Ball. Reach for it. Reach for it. Too fast! Too fast! Leg caught; snakey tangle. Spinning tumble up down. Ow! Lamp totters. Catch it, catch it, catch it. Frozen falling lamp standing still. Noise. Clump. Clumpclump. Brightyellowflash.

Shat[CRASH]ter.

She turned at the sound of the crash and, shoving her fist to her mouth, ran for his bedroom. Heart thudding. Fearing what she might find. "Ethan!" He was out of his crib, smiling blankly, windmilling his arms as he staggered around the room. His left ankle was tangled in the cord for the floor lamp, which had toppled, smashing the shade and shattering the bulb. Tiny, sparkling shards of glass glistened in the carpet.

"Ethan!" She swept him up in her arms, untwisting the cord with a practiced movement. Anger fighting relief, she held him tight. "Oh, Ethan. Naughty boy. You could have been hurt."

"Baaall," said Ethan in his typically slurred voice. He held onto her neck and planted a wet smack of a kiss on her cheek. "Lamm. Me. Pie." She squeezed her arms and eyelids tight. Her cheek was cool where wetness lingered. He didn't even know her. He was off into his own personal universe where she couldn't follow.

"Is there anything I can do, Alma?" The gruff baritone voice from behind reminded her that she had left the front door open when she had run for the bedroom. She turned and faced him, cradling Ethan against her hip. Soon the boy would be too big to pick up; too big to handle. What then? What then? She would find a way. Something. She would cope.

"I'm sorry, Mick. You see how it is. I can't leave him alone for a second."

Mick reached out and tousled the lad's hair. "Hi, there, boy. Do you remember Uncle Mick?" Alma stiffened at the familiarity of the gesture.

"He has his good spells," she told him. "Some days he can follow simple directions. He can even speak a complete sentence. But most of the time . . ." She hesitated and caught her lip to keep it from trembling. "Most of the time he doesn't make sense at all."

"Mamma," said Ethan, smiling into Mick's face.

Mick gave the boy a shadowed look and an uncertain smile played across his mouth. *He doesn't understand, either,* she thought. None of them did. None of

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that procession of men that had passed through her life since Nate had run out on her. They all stumbled over Ethan, sooner or later. They all yearned for her undivided attention, and they couldn't have it. Not while Ethan needed her. Someday soon Mick would utter those hateful, selfish words. *Why don't you put him in a home?*

Mick could see the entire evening laid out before him as he rubbed the hand vacuum back and forth across the rug. The tiny shards of glass tinkled as they were sucked into its maw. From the kitchen he could hear Alma's voice canceling the baby-sitter. Silly. She'd have to pay anyway. The agency supplied RNs to baby-sit special children. You couldn't book them and then cancel at the last minute. He shook his head and rubbed his hand through the carpet nap searching for uncollected fragments. He'd tried telling her that just one time and, Jesus, you'd've thought he'd suggested dumping the kid on a country road.

He glanced up at the crib, where Ethan lay strapped on his back, staring at the mobile dancing inches before his face. Little wooden ducks with wings that beat mechanically as they circled. Up, down, around and around. Forever flying south for winter. The kid was too big to be in a crib anyway. And—a quick, almost furtive glance at the larger bed—too big to sleep in his mommy's bedroom.

Oh, yes. Alma and he would spend a Quiet Evening at Home. She would cook for him; and they would watch something halfway decent on the tube. The movie they'd planned on would be out on video eventually. And as for the restaurant. . . . Well, Alma was a decent cook. Later, they would philander on the sofa; but always, always with one ear on the bedroom. And then she would take him by the hand and lead him in here softly tiptoeing. And half the time they would find Ethan still wide-eyed awake staring at them; and half the time Alma would stop half-aching-way and ask what if he did wake up; and half the time he couldn't do it himself because what kind of a pervert did it in front of a kid? And that made three-halves, which pretty much summed it up.

When he turned off the hand vacuum he could hear Alma's muffled sobs from the kitchen. He squatted on his heels, listening. Yeah. She wanted the freedom as much as he did; but the kid was an anchor around her neck dragging her down, down, down. She was killing herself and the kid didn't even know it. So far, once—exactly once—they had made it out of the house. And it was the grace of God that the restaurant and the movie theater had had public phones so she could check with the nurse-sitter every half hour.

"Kid," he muttered, "sometimes you're a real pain in the butt."

"Ethan bad. Ba'boy."

Mick jerked his head up. The kid had abandoned his mobile and was staring at him between the bars of his prison. He began to jerk his body, so that the crib shook rhythmically back and forth. "Mick!" Ethan beamed. "Uncamick!"

Ah, hell, you had to love the kid, didn't you?

* * *

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She raced back to the bedroom with the tissue crumpled in her hand. "What is it?" she asked. "What was the noise?" Mick was squatting by the crib with his face half-stuffed between the bars. "What's wrong?"

He turned a silly smile on her. "Relax, Alma. Ethan and I were just making faces at each other, that's all."

"Did you get all the glass vacuumed up?" She dropped to her hands and knees and rubbed the carpet. "No. Here's a piece you missed. Christ, Mick, can't you finish a job? Those tiny reflections. He *notices* things like that. Things you and I would pass right over. What if he picked it up and swallowed it? Here, give me that vacuum." She snatched it from his hands. Mick stood up and stepped back. The motor hummed and she rubbed it back and forth through the nap of the rug.

His shoes moved at the edge of her vision, shifting his weight from side to side. "Make yourself useful," she said. "Start the meal. You can boil a pot of water, can't you? Start the spaghetti. Do *something*."

"Alma—"

"Leave me alone!"

She saw the feet shuffle and move away. A few moments later, she heard the front door close. She rocked back on her heels and turned off the vacuum, and hugged herself tight. *I won't* cry. *I* won't *cry*. I *won't cry. He would have dropped me anyway*. You could see it coming. Men liked divorcées: They were experienced, saddle-broken. But men didn't like them with children in tow; and they doubly didn't like them with retarded children in tow.

"Uncamick," said Ethan.

"Shut up!"

The boy's face crumpled and his mouth twisted into a knot. Alma sprang up, unstrapped him, and hugged him to her. "Oh, Mommy's sorry." She rocked him back and forth in her aching arms. "I didn't mean to yell at you."

Knifesharpsmell tickles nose. See white dress nurse close door. Soft-comfy-springy touch on heiney. Hum-hum. Hear door close. Sit on sofa next to Momma. Flash. Gentle breezes tickle arms and face. GreatBIGface! BabblebabbleEthanbabble. Deep voice not-Mick. Flicker! Bright spinning colors. Ghost hands reach for it; reach for it Hum-hum-hum. Nothing. Hands held tight and soft. Spinning colors move and turn and reach and. Got it!

It was a neat office—tidy, but not sterile. The walls were hung with comforting diplomas; and, amidst the clutter on the desk, sat a nameplate carved in oak: *Doctor Dave*. The man himself—thin and sporting a great big bird beak of a nose, beaming face encircled by a sunburst of hair—sat at ease behind the desk and smiled.

It was all supposed to relax her, she knew. A doctor's office, yes, but homey. Chocked with familiar features. Crayon drawings in childish hands thumbtacked to the wall beside the stern diplomas. A somber row of medical texts . . . but festooned with colorful page markers. A stand-up, Lucite photograph on the desk

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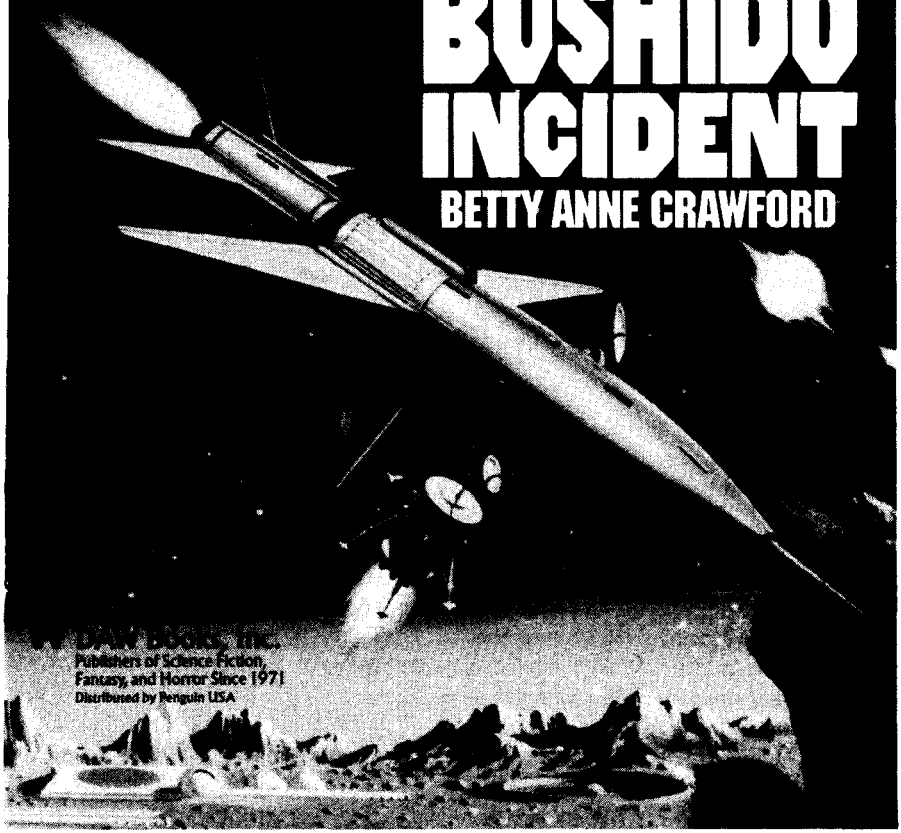
THE BUSHIDO INCIDENT

BETTY ANNE CRAWFORD



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featuring the doctor embedded in familial bliss. She shifted slightly to a more comfortable position on the sofa and straightened her skirt. She didn't know what she was doing here. Doctor Khan had referred her, but . . . she couldn't afford a specialist; certainly not a . . . she squinted at the diploma again. Certainly not a pediatric neurologist.

She glanced at Ethan, who was staring off at some infinite wonder, and put her arm around his shoulder. "Don't worry, Ethan," she whispered to him. "There's nothing to be frightened of." She did not expect a response; was not disappointed when she received none. What sort of vision was he staring at? What sort of dreams did he have?

The doctor folded his hands into a ball on his desk. "I'm glad you could come and see me today, Mrs. Seakirt. From what your pediatrician told me when she referred your case, I believe we may be able to do something to help little Ethan."

She had heard those words before. They had never meant anything except high hopes and disappointment. She shook her head. She would not allow herself to be disappointed again, even if it meant foregoing hope. "I won't see him institutionalized, Doctor Silverman. He's *my* obligation. I won't turn my back on him the way my husband did." *Ex-husband.*

Ethan pulled away from her. "Frightened," he said.

"You're scaring the boy," she told the doctor, pulling Ethan to her. She stroked his hair gently and he snuggled against her. After a moment, he began to make small, contented noises. Alma looked back at the doctor. "He's happy with me."

"No one says otherwise, Mrs. Seakirt. We do not plan to institutionalize him."

"Then what? He's been in and out of every therapy there is. Play therapy, clown therapy." Even God help her, aversion conditioning therapy. "None of it has helped and the insurance has long run out. Ethan is severely retarded. That's something I have learned to live with, that's all."

"I love you, mamma," said Ethan suddenly, and Alma tightened her hug on him.

"And I love you, too."

Silverman seemed about to say something, then changed his mind. Instead, he reached into a drawer and came from behind his desk with a brightly colored mechanical pinwheel. He squatted in front of Ethan. "Hi, Ethan," he said. "My name's Doctor Dave. I'd like to be your friend." He held the pinwheel in front of Ethan's face and caused it to spin by pumping the trigger with his thumb. The petals whirled and the colors seemed to dance.

Ethan did not react. He simply grinned into space.

"I told you, doctor. Ethan is retarded."

Silverman nodded. "Yes. I think that is exactly right." He paused. "Mrs. Seakirt," he said, "do you know much about computers?" He continued to pump the pinwheel while he studied Ethan's face.

Computers? Why on earth did he want to talk about computers? Well, let him explain things in his own way. The consultation was not costing her anything. She

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had been quite firm about that when Doctor Khan had suggested it. "I have a workstation at home. My office lets me telecommute because of Ethan. They are really very understanding. They know that . . ." She was babbling. She had met Mick because of her telecommuting. His company had the maintenance contract on the PCs, and one day he had come by personally to see how. . . . Alma took a breath and smoothed her skirt once more. "I can operate a desktop and modem," she said, "but I don't know any of the theory."

Silverman's grin split his beard. "Neither do I. I leave that to Tom. But I do know that there is something called an I/O buffer." He transferred the pinwheel to his left hand and, holding it off to the side, he caused it to spin again. Ethan did not turn his head to follow the movement.

"Input/Output buffer," she started to say; except that Ethan began to bounce up and down on the sofa, waving his hands in the vacant air in front of his face. Alma caught her lip between her teeth. She knew the pattern. Soon he would start flailing about and crying. She reached an arm out to stop his agitation, but Silverman stopped her. "Excuse me," she said in a voice that tolerated no excuses.

"Pretty," said Ethan. "Pretty-pretty-pretty- pretty-pretty-pretty- pretty-pretty."

"Just bear with me a moment, Mrs. Seakirt. Tell me, does your I/O buffer ever become backed up?"

She spared an anxious glance at Ethan. "Yes, sometimes." She struggled against Ethan's jouncing. He was becoming unruly. He would embarrass her in front of the doctor.

Suddenly, Ethan twisted to the right and his flailing hands grasped hold of the pinwheel that Silverman had been patiently spinning all the while. Silverman closed his own hand over Ethan's so he would not drop the toy. A few seconds later, Ethan grinned.

Alma fell silent and stared at him, while Silverman waited, watching her. The silence lengthened a beat or two, until Ethan slurred, "Prettypretty," again. Alma's heart was suspended over a deep chasm. Silverman had held the pinwheel *here*, then *there*. And Ethan had reached for it *here*, then *there*. But late, seconds late. "Doctor. . . ?"

Silverman pursed his lips and nodded. "I told you. He is simply retarded."

"Retarded," Silverman repeated a few minutes later, after Alma had composed herself. He had asked the receptionist to bring them both cups of tea, and he returned to his throne behind the desk, dunking his bag up and down, up and down.

The hot, bitter liquid had helped calm her, but her heart still hung dizzyingly over the abyss. She watched Ethan playing with the pinwheel beside her on the sofa. The boy had discovered that the trigger made the blades spin. He would push the trigger (and the blades would spin, and slow, and stop.) And a moment later, his eyes would light up. And then he would laugh at the unmoving pinwheel. That behavior had never made sense before. Now . . .

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She sat the trembling tea cup on the lamp table. "Ethan's I/O buffer is backed up," she recalled his earlier words.

"That's right," said Silverman, squeezing his teabag against a spoon. "Ethan's mind may be as sharp as yours or mine, but the sensations—the sights and sounds and such—arrive moments late, perhaps even out of synch; and the responses are delayed as well. High viscosity sensation, I call it. Tell me, Mrs. Seakirt, does he cry often?"

A lifetime of reaching for things that were no longer there. Oh, God, the disappointment! "Yes," she said. And then, more firmly, "Yes, he does." She looked back to Ethan, sitting beside her, playing with the fascinating toy. When he dropped it, as he eventually would, he would not realize it for several seconds, because according to Doctor Silverman, he would still be seeing an "afterimage" in his hand. That was why he had trouble picking things up: he reached for an *image* of a fallen toy and, unless he had held—or had been held—completely still in the meantime, his groping fingers would close on nothing—or on the wrong thing.

It was strange, thinking that way. In a way, her son was blind. Blind to *now;* seeing only *then*.

"And his speech," continued the doctor. He took a sip of his tea. Alma had already downed hers in ragged gulps. She clenched and unclenched her fists in her lap. She wanted him to *get on with it*. Explain my child to me! "Since he doesn't hear his own voice when he speaks, he lacks the feedback we all use to control our timber and intonation. He keeps hearing echoes of what he has already said. That—"

"I called a radio talk show one time," Alma said, "but I forgot to turn my radio down. You know how they use tape delay? I started hearing my voice saying what I had said three seconds before. It was impossible to think straight."

Silverman nodded. "Exactly. Ethan talks in short bursts most of the time so he can finish before the echoes start. I imagine that his longer vocalizations are very rhythmic, and full of repetitions."

Prettypretty. Once he had sat for nearly a quarter of an hour saying *mamma mamma mamma* over and over, until his tongue had finally tired and lost the rhythm. "Why, yes, they—"

"You know why, don't you? He is synchronizing his voice to the echoes. Ethan lives in a world of afterimages and echoes. It's amazing to me that he functions as well as he does."

"Doctor," she said suddenly. "Sometimes he hunches up with his eyes closed tight and his hands over his ears. . . ."

"Waiting for the buffer to clear."

It annoyed her the way he sometimes finished her sentences. "What about his other senses?" she asked. "Smell and touch and taste."

"His tactile and proprioceptive senses are probably unaffected. And likely his smelling, too. Odors go straight to the old reptile brain. If he dropped the pinwheel,

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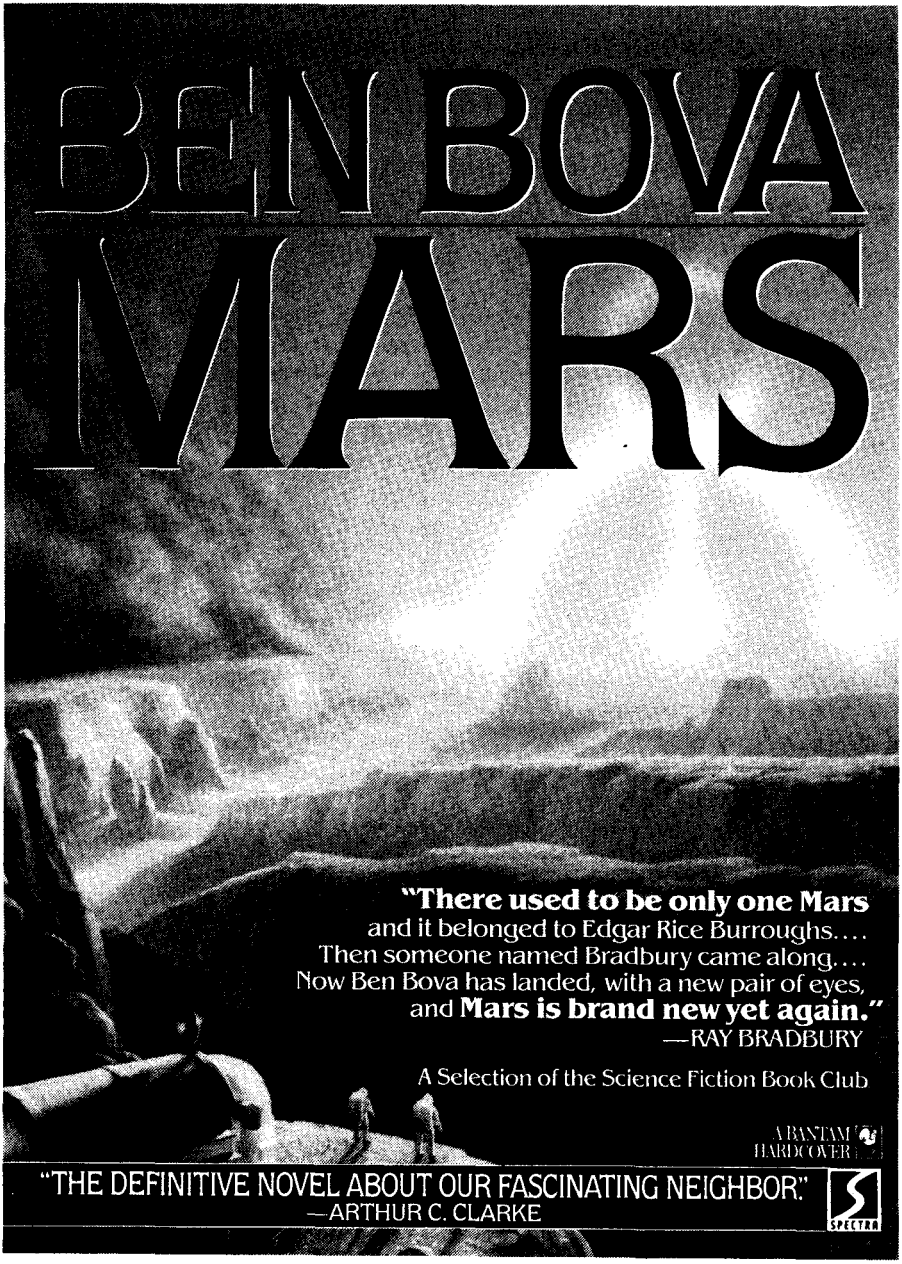
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he might notice something odd because while he could still see it, he could no longer feel it. He may have learned to use such moments as cues to enable him to cope somewhat. We'll run the usual tests to be sure; but that is how it has been with the other children."

"There are others like Ethan?" That surprised her—that there should be others like Ethan.

"Some. Not many. Autism and dyslexia are much more common I/O disorders. But I have described several cases in the *New England Journal.*"

Ethan dropped the pinwheel. It fell to the floor while he continued to gaze happily at his empty hands. Alma quickly scooped the toy up and placed it back into Ethan's hands, as she had done with countless toys countless times before. Always in vain, because Ethan would drop them again. She had always thought that it had been from loss of interest. But she knew how to handle it now. *She knew how to handle it!* Ethan cried, "Oh!" and made his belated grab toward the afterimage of the fallen toy; but Alma held his hands tight around the pinwheel's handle and waited for his vision to catch up with his reality. When she released him at last, he again had a firm grip on the toy.

Three seconds later, he said, "Thankyoumamma."

She turned back to Silverman. "It's so simple. All those years, and I never noticed."

"Not so simple, really," Silverman assured her. "It just seems so with hindsight. It's not something we're conditioned to notice. We're so used to living in the Now that it's hard to imagine that others might be . . . living on tape delay. Only after a period of relatively constant inputs—say after napping or engaging in an absorbing, repetitive task—does the buffer clear. My colleague believes it is the variability of the imputs that somehow overloads the brain's buffer. Provide a low-sigma data stream and—" He stopped abruptly and laughed. "I'm sorry. I'm starting to talk like he does."

"Doctor Silverman, who is this colleague you keep referring to?"

"Oh. I didn't say? Doctor Zachariah. Tom Zachariah."

"He's not a pediatric neurologist, is he?"

A slow shake of the head. "No, he's a Ph.D., not an M.D."

Not a real *doctor, in other words.* "And his degree is in. . . ?"

"Computer science."

"I see." She had known he would say that. All that talk of computers and buffers and they were sitting in a doctor's office, after all. "And what is it you propose to do to my Ethan?"

Silverman stared at her for a moment and rubbed the side of his ample nose. "Bypass the buffer," he said.

Food smells. Sweet and delicious. Babblebabble EthanbabblebabbleMick. Hug Momma! Hug hard cold smooth Momma. Kiss her warm. Cold metallic taste.

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Flicker. *And. . . . Momma gone. Silvermetal table leg reflecting long thin mirror-shaped Ethan. Warm tears flow. "Momma!" Babblebabble. Fly!* [*Vertigo.*] *Grab soft warm table leg. Sweet Momma smell. Smoothsofttouch. Hairs tickle. See Momma reaching down!*

"Yes, mother," Alma spoke patiently into the phone. "Yes, mother." It was hard balancing Ethan on her hip and the phone on her shoulder. "Nothing. He tried to kiss the dinette table leg, that's all. No, I've told you that before. This *is* his home." Ethan squealed in fright—of what? What had happened a few seconds ago?—and grabbed her choking tight around the neck. His breath was sweet and hot in her ear. He whimpered and Alma hitched him around so she could support him more easily. "I thought I would let Dr. Silverman test him. No, it won't cost me anything." *Not that that would affect you anyway, you tight-fisted bitch.* "Dr. Silverman said that part of the costs are being covered by a donation and the rest by a federal research grant. Research grant, mother. Yes, I know that means it's an experimental treatment. No, Ethan is not a lab rat. Mother, Ethan is my son and I will decide what's best for him. Certainly, mother, I always treasure your advice." *Whether I take it or not.* "Good-bye, mother. Yes, yes, I know you only want what's best for me."

She fumbled with the phone and it slipped from between her chin and shoulder and swung at the end of its cord, banging against the wall like a suicidal bungee diver. She set Ethan down (and he danced in circles, arms outstretched crying, "Mommymommmymommy" and laughing), and she hauled in the receiver like a fisherman hauling in a net. She checked quickly to see if Beatrice were still on the line. Beatrice would assume that the banging sound had been her daughter slamming the phone on the hook and they would go around and around about it.

But she heard the happy dial tone and, with a sigh of relief, cradled the wall phone. Mother's problem was a compulsion for micromanagement. Strategic advice was not enough for her; she was a master tactician, as well. She could not simply tell Alma what to do—half her friends were plagued with parents who still did that—but she had to tell her how to do it and when to do it, and she offered critiques afterward. It had never been simply: *Do the dishes, Alma, dear;* but *Why did you do the plates* before *the glasses?* Never just: *Get dressed for school, Alma, dear;* but *Why don't you wear the new plaid skirt with the pullover sweater?* And always, always, the orders were framed as questions. She had spent a lifetime trying to guess what Beatrice had wanted of her; and a lifetime guessing wrong.

It's not right to experiment with children. Oh, isn't it, mother? What was that medicine you made me take? Better than the Pill; better than a diaphragm. An implant inserted under the skin at the clinic, so you never had to worry about being careless, or forgetting, or the damn thing *leaking,* for cripes sake. So all you had to worry about was—

Chromosome damage.

And Ethan.

Thank you so very much, mother, but I will take it from here.

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She took the phone off the hook again and scanned the bulletin board where she had pinned the doctor's card. She hurt her finger when she stabbed the buttons.

Tom Zachariah, to Alma's surprise, was an Indian. Not a wild west, whoop-em-up, paint and feathers Indian; but the short, tan kind from South Asia. He had an office of unbelievable clutter. Books, magazines, reams of machine paper—one accordion pile snaking onto the floor like a stationery Slinky, a pulpish creature creeping off the desktop. Odd corners of desk, table, and shelf were occupied by the eviscerated remains of computer equipment: slain, half-eaten and left for electronic jackals; circuit boards and the short ends of wires exposed like rib cages in their gaping carcasses.

Zachariah folded his hands as if praying. He smiled at her. Everyone smiled at her; pity or sympathy or even friendliness, she didn't know. His face was a muted coffee, thin and with a narrow nose, the cheeks pocked with the craters of ancient acne, as if he had been the victim of a very tiny shotgun blast.

"So, Mrs. Seakirt," he said, with his odd, melodious accent rising and falling in unexpected turns. "You are Ethan's mother."

She had the sudden disorienting notion that he was appointing her to that post. It hadn't sounded like a question. "Why, yes. Yes, I am. They are testing him now." She wondered if he could fail the tests. *What if he's not suitable for their "procedure"?* She picked at imaginary lint on the arm of the leather-clad captain's chair. *He's never been apart from me this long.* What if he panics? I should have remained with him. I should have insisted.

Zachariah nodded. "Dan will take several hours at it, but the preliminary results last week looked very promising. Tactation and proprioception are in real time, as we had thought. Otherwise, Ethan could hardly stand upright. Olfaction is only slightly delayed. Meanwhile, I— Yes?"

"Excuse me, Professor Zachariah, but I hope I'm not being personal. . . ."

"Yes?" He waited smiling.

"You are Indian, aren't you?"

His smile broadened. "Oh, yes indeed. From Kerala State on the Malabar Coast."

"But, your name. Thomas Zachariah?"

"Ah, Mrs. Seakirt, India is no more homogeneous a sub-continent than Europe. There are twelve million Christians in India. A community that dates back to St. Thomas the Apostle. His missionary travels were not so well documented as St. Paul's, I fear."

"I see. I didn't mean to pry. I—"

He waved a hand. "No, no, no. It is perfectly all right. It is the fallacy of overgeneralization. All X are Y. We all suffer from it. When I was a child in Kerala State, I thought all Americans were either cowboys or gangsters." He laughed at his childhood foolishness.

She laughed with him. "All right, Professor Zachariah—"

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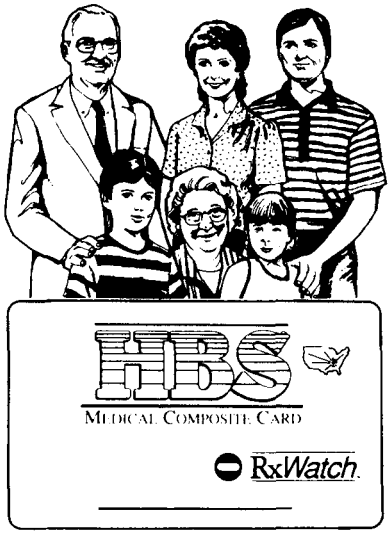

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"Call me Tom." He leaned back in his desk chair and the springs and leather creaked. "Computer nerds are not formal."

She was suddenly fascinated by the coordination of her own senses. What must it be like, Alma wondered, if the creak of the chair and the sight of Zachariah leaning back entered the brain at different times? How could you ever learn to associate a sight with a sound with a touch with a smell with a taste? "All right, er, Tom. Dr. Silverman said that you would explain the computer side of the procedure to me."

"Yes. You understand it is still experimental. We have had excellent responses with chimpanzees, and a few preliminary studies with other children that look good. But, we can not promise results."

"It won't hurt him, will it?"

"No." He seemed startled. "No, of course not. That much we can promise."

"Good. I won't let him be hurt."

He blinked. "None of us want to hurt him, Mrs. Seakirt. We will simply drill a hole through the skull—"

Drill a hole in my child's head.

"—to a certain area of the hypothalamus that Dan has identified. I am sure that he has already explained that all sensory inputs, indeed all neural impulses—"

"Are identical. Yes, he did. And the brain decides whether you are holding sandpaper or smelling roses based on the locations of the sensors and the destination area of the brain."

Zachariah seemed pleased. "Exactly. In some cases, the signals go to the wrong areas of the brain, so that the individual smells 'purple' or hears 'sour.' Very complex problem. Very complex. That, of course, is not your son's condition. Here we have a much simpler case—or we believe we have a much simpler case—in which the associative neurons of the hypothalamus are retarded. Am I, er, 'snowing' you, Mrs. Seakirt?"

"No. Dr. Silverman already explained about affectors and effectors—the input and output neurons—and the associative neurons that connect them." *I wonder what they are doing to Ethan right now? While I sit and chat nonsense with this smiling man with the funny name.*

She rubbed her hands forward and backward along the chair arms. Ethan would be frantic by now at his separation from her. Zachariah's words dipped into and out of her consciousness like a stone skipping on the water. "—an electronic device of my own devising—" *What if this procedure of theirs fails?* "—plug-in skull module—" *It is experimental, after all.* "—portable computer with neural net logics—" *I work with computers; I* know *how they can bomb off.*

"So in essence, Mrs. Seakirt, the sensory inputs will be routed through the computer directly into the receptor areas of the brain. You may think of it simply as a new sort of bypass surgery. Do you have any questions?"

What if it doesn't work?

* * *

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Fresh, bright laundry smell, Sharp odors. Smell of medicine.	*Gummy sour taste in mouth, Sticky sweet.*	*Soft, cool sheets covering gently, Head hurts [ow!].*	*White sheets cover body. Bed rails up like crib.*	*Soft rustle sounds,*
Sweet momma-smell.		*Room spin slowly, slowly,*	*White dress nurse walks by with tray. Smiles,*	*"Ow!" Rattle of glasses on tray. "Why hello, Ethan, awake already?"*
		Turn head. Still hurts!	*Mommy! sitting by bed. Tiredsadlook.*	*"Good morning, baby."*

She tried not to look at the cable snaking from her son's head; but it was impossible not to look. It was a flat cable, the ribbon kind, and it was coupled to a 50-pin intelligent port implanted in Ethan's skull. Tom Zachariah's "little device." The other end of the cable was an IBM/PC9 with Intel 80786 chips. State of the Art, Zachariah had assured her. The cutting edge. And, for the life of her, she could not decide if her son was hooked up to a computer or if a computer was hooked up to her son.

He opened his eyes suddenly and jerked his head back and forth. A nurse walked by with a clattering tray and Ethan followed her movement. "Why hello, Ethan," the nurse said, "awake already?" She did not wait for an answer but continued on her mission. Ethan turned again and looked Alma in the eyes. Bright, aware, "real-time" eyes. "Mama," he croaked with a throat sore from the anaesthesia tube.

"Good morning, baby," she said. Mornings and after long naps were always the best times. They were the times when she felt Ethan was really there; when there was a human being behind the eyes and not a—God help her!—not an animated biological machine. But it never lasted. It never lasted. If Doctor Silverman were right, Ethan's sensory input channels quickly backed up.

Except that today was supposed to be different.

She studied the cable once more. Different. Whatever was wrong with Ethan's brain, Silverman did not know and could not repair. The brain was still an unplumbed mystery. The best he could manage was this . . . computer bypass. This experimental computer bypass. Something that would synchronize what Ethan's brain could not. If Doctor Silverman were right, Ethan could make sense of his inputs now. He could learn things. He could go to school. He could be like any normal boy.

She ran a finger along the computer cable to the computer with the convenient wheels and handle. A normal boy.

Only different.

* * *

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Beatrice sat all hunched into herself on the sofa. The coffee cup clenched in the right hand hovered above a saucer held firmly in the left. (China, of course, one never served Mother on plastic!) "Why does he stare at me that way?" she asked.

Ethan stood before her, solemnly silent. His mouth half open; his left hand gripping the handle of his "wheely." The umbilical snaked from his skull socket to the processor. His thoughts traveling up and down the wire so the machine, like a patient secretary, could sort them out. No, not his thoughts. Simply neural impulses, translated to electricity and back again by Tom Zachariah's electro-neural transformer. They were not *thoughts* until the proper region of Ethan's brain made them so.

Alma saw how her mother's eyes kept tracking on that cable, following it back and forth from machine to skull and back, and not once lingering on Ethan's face. "He is trying to make sense out of you, Mother." And she enjoyed the double take that triggered. *Good luck, Ethan. I've been trying for twenty-five years without success.*

Beatrice sniffed. "I thought that connecting him to that . . . thing was supposed to cure him."

"It's not so simple, mother. Tom explained that we have years of garbled cognition to unlearn. That's why the classes are part of the treatment. Ethan learned certain compromises of behavior and coordination that enabled him to get on despite the viscosity of his senses—" That was a good phrase. Viscosity of the senses. Trying to push a message through thick mud. Much like holding a conversation with Mother.

"So, it's Tom, now? What ever happened to Doctor Zachariah?"

"Mother, we're friends. He and Doctor Dave and—"

"At least your Silverman is just a Jew and not a jump-up, dark-skinned Hindu who—"

"Mother, he's a Christian." *Which you are not!* "He cares about Ethan."

"Oh, and I suppose I don't. I am only the boy's grandmother, after all. I only want what's best for the both of you."

Ethan jumped up and down. The cable snaked in sinusoid curves. "Gammah!" he announced, pointing at Beatrice. "Gammah!" His voice was still slurred a little, but at least he was hearing how his own voice sounded and the feedback was helping him correct it.

Beatrice looked at the boy. "I still say it isn't natural."

Mama was always warm and soft. Always the same. Never hard or cold or fuzzy or anything else. And Lambie-pie was always soft and fuzzy and always there when he reached for him and the music made the duckies fly and the flying duckies made the music whenever mama twisted the thing on its side and the bedroom was always over there and the living room over here and the voices only happened when people moved their mouths except for the box voices on the teebee though even there the box people moved their mouths and he could put his pretty ball down and go away

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and come back and it would still be there and he could reach out and pick it up and it was all so wonderful!

Mick pushed the doorbell once more and stepped back so he would be clearly visible through the peephole. Modern life had evolved its own code of etiquette. He glanced up and down the narrow road, lined with trees and bushes and plots of flowers. *The 'burbs*. Not the Mean Streets, but the Bland Streets. They twisted around each other in such a way that this group of houses formed a circle around a patch of woodland in the rear of the properties. The woods were inaccessible from the street and, hence, undevelopable. They formed a refuge for 'coons, muskrats, squirrels, and other suburbanites. It was all supposed to make you forget that you were in the most densely populated state of the Union.

He wondered what Alma's neighbors thought of Ethan's prosthetic. Did they approve? Did they care? He would probably never know. Alma would probably never know. A man jogged along the blacktop past Alma's house. Mick watched him. The man looked neither left nor right. He wore a headset and his eyes were narrowed in concentration. *Sunk into his own private world,* thought Mick. *Does he even know he has neighbors?* How could people live so close together and yet be virtual strangers to one another?

The door opened just as he was about to ring again and Alma stood framed in the doorway. "Mick," she said, her voice laced with surprise. Not pleasure. Nor unwelcome. Just a neutral surprise.

"Hello, Alma." He kept his hands hidden behind his body. "Surprised to see me?"

"I— Yes. Yes, I am. After you ran out, I never expected to see you again."

Mick kept the smile on his face. *I didn't run out. You drove me out. You were stressed and I couldn't deal with it.* "Are you going to invite me in?"

Alma hesitated a fraction of a second, then stepped aside. Mick crossed the threshold and brought his right hand out. He held a copper bowl with a spray of daffodils and greens. Alma's face unfolded with delight and Mick sighed in quiet relief.

"Oh, Mick, they're lovely. And they're live, not cut. Thank you." She turned away from him and set them on the sideboard in the entry hall. The yellow of the flowers contrasted nicely with the dark wood; the mirror on the wall behind multiplied the flowers into a garden. Mick could see Alma's reflection smile down at the flower bowl. "And what's in your left hand, Mick?"

"Oh, this?" He held out a brightly wrapped rectangle. "It's for Ethan."

"Ethan." Alma's lips parted and her head bobbed once, slowly. "Of course, Ethan. What is it?"

"Let me give it to him." Mick stepped into the living room with Alma half a pace behind. "Ethan? Where are you?"

He heard a squeak-squeak-squeak, and the boy stepped from behind the breakfast

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bar that fronted the kitchen. His face brightened. "Unnca Mmick!" And he hastened toward him, with his computer appendage in tow. "Unca Miiick!"

Mick turned to Alma. "He recognizes me," he said with pleasure.

"Yes, he's become— What is that in his hand? A sandwich? Oh, my God." Alma ran to cut Ethan off.

Mick stood open-mouthed. A sandwich? And she freaks out?

"Oh, Ethan! Ethan. You know you shouldn't do that. You could have cut yourself."

Ethan held his other hand up. "Knife," he said. Alma grabbed it from him in a convulsive gesture.

"For God's sake, Alma. It's only a butter knife."

"He can hurt himself with it! He can."

Ethan's eyes went big and round. "Hurt?"

Mick hunkered down on his knees. "Hey. Hey, guy. Look what I brought you. Look here." He held up the brightly wrapped present and waved it.

Ethan forgot his fears instantly and turned to Mick. "Pretty," he said. Mick handed the gift to him and watched as he laughed and tore off the wrappings.

It was a Dr. Seuss book. The boy goggled at it, then looked at Mick. His mouth was a silent O. Then he turned and held it up to his mother.

She took the book from him and opened it. "Oh, Mick, he can't read."

"Not yet, but he will soon."

"It will take time. Doctor Silverman said it would take time. He still needs me."

"Of course he does, but as time goes on, he'll be able to do all sorts of things on his own. Won't you, Ethan?"

"Only up to a point, Mick. After all, an artificial leg doesn't let you do everything that a two-legged person can."

"I suppose not." Ethan would always be slow, Dave had confided in him. Years of retarded sensation had inhibited his learning. He could learn now, but he would probably never function at age level.

Mick refused to feel sorry for the boy. Maybe Ethan would always be a few rungs down, but at least he was on the ladder. "Think positive, Alma. You won't have to worry so much."

"What do you mean?"

"When you go out. About his getting into trouble. You know."

"He can still get into trouble. Even normal boys get into trouble."

"Sure, but—"

"You don't care about him at all, do you?" She waved the Dr. Seuss book in his face. "You thought that just because he has his prosthetic I can abandon him, like other single mothers. Go out, have a good time, and never mind the kid."

"Now, wait a minute, Alma. That's not fair. You have a life, too."

"You're just thinking of yourself. All you've ever wanted to do was get inside my pants. Get between me and my responsibilities. Don't you know how much

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Ethan needs me? Who do you think you are? You come in here trying to run my child's life—" Mick ducked as she threw the book at him. Ethan jumped and tried to grab it as it arced over his head. "Go on. Get out of here!"

Outside, Mick shoved his hands in his pants pockets and kicked a stone down the driveway. What in the world had brought on that tirade? Did she resent him that much for walking out on her before? Running her child's life. . . . Did she know? He looked back over his shoulder at the silent door. The federal grant would not have covered the surgery, let alone the remedial therapy. There just wasn't enough money in the public coffers. But Dave had promised that he wouldn't tell Alma where the rest of the money had come from. He had promised. And that ungrateful Alma—

He walked down the driveway toward his car. Silverman hadn't revealed anything. He cast a last look back at the door. Alma would have thrown it in his face if she had known. And so his savings were gone with last winter's snows and he didn't even have a thank you to show for it.

He remembered Ethan jumping for the book as it sailed past him. Living in real time, like any normal boy. He remembered Ethan's delight when he had torn the wrappings away.

He unlocked the car door. And caught himself whistling. *Funny. Alma was right. I did have selfish motives. I thought that if Dave and Tom could fix Ethan up, she could make room in her life for another person. For me. Alma and I could have a normal relationship.* But the weight of the chains lingered long after they had been cut away; just as Ethan's vision had lingered after he closed his eyes. It hadn't hit Alma yet that the chains were gone. And when it did, it would be too late for him to step back into her life. Someone else would reap where he had sown. And yet, he was whistling.

Because he did have a thank you. A child's smile. Calculate the ROI on *that.*

The supermarket was never crowded this early on a Saturday, which was a good thing because Dave had told her that large crowds might still be stressful. Too much input all at once. Neural nets, Tom had explained, also need to learn. It wasn't as simple as "plug him in and turn him on."

She could feel, and sometimes saw from the corner of her eye, the way the other shoppers turned their heads to stare at Ethan. It did not seem to bother him. He strolled along the aisle by her side staring at the rows of brightly labeled cans. He pulled his "wheely" along in his left hand. One of the wheels on the computer had lost a bearing or something because it squeaked as he rolled it along.

Another mother, with a ten-year-old boy in tow, passed her in the aisle going the other way. Again, Alma saw how the eyes tracked the computer and then flicked ever so briefly to Alma. The other boy was overweight, his cheeks so full that they pinched his eyes into slits behind his cola bottle glasses. He was eating

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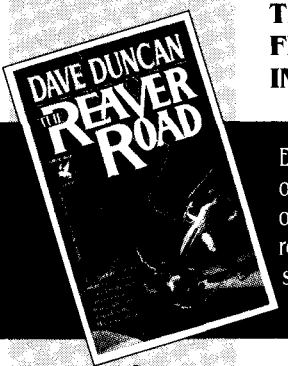

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from a torn-open bag of candy corn. He gawked openly at Ethan; then he pointed and laughed. "Get a Walkman," he said.

Alma ignored them and they disappeared down the aisle and turned into Baked Goods. Ethan tugged at her sleeve. "Mamma," he said. "Maamaa. Wassa Wawkmaan?"

"Never mind for now, Ethan. I'll tell you later." She checked her shopping list. "Let's see. We need cereal. And what else? Peas, carrots, green beans. And milk. No." She pulled the pencil from behind her ear and crossed that off. "We already have the milk, don't we Ethan?"

She looked down by her side and he was gone.

Her heart flipped over. Ethan? Where was he? Why hadn't she heard the squeaky wheel?

Before she could move, she did hear the wheel and Ethan turned the corner from the next aisle over. He had a colorful box of cereal balanced on his computer, which he pushed before him like a shopping cart. "Fouund it, maamaa!" he said. "Found it." He grabbed it off the computer and held it up to her.

"Oh, Ethan, you don't like that kind of cereal. You want the one with the jogger on the front. Don't worry. Give it to me; I'll exchange it. Stay right there and don't move."

She hurried to the dry cereal aisle and set the cereal box on a shelf at random. She ran her finger along the ranks of boxes, looking for—

A cry! Ethan!

She scurried back to the canned vegetable aisle to find the fat boy pulling on Ethan's umbilical cable. "Let *me* listen," the fat boy was saying. "It's *my* turn." Ethan was crying and waving his arms, trying to grab the cable. Every time the fat boy tugged, Ethan's head jerked.

"You let go of him, you awful boy! You let go!" Alma strode toward them.

The fat boy saw her coming and dropped the cable and ran, calling, "Mommy."

Alma dropped to her knees next to her sobbing son. He was rubbing the shaved spot on his head where the cable was attached. "It hu-hurts," he said. "It hu-hu-hu-hurts." He talked in gulps between the sobs.

"Don't worry, Ethan. He's gone. I won't let him hurt you again." She hugged him and stroked his head gently.

"What did you do to my son!" It was a loud, angry voice and Alma turned to see the fat boy clinging to the jeans of his mother. He was pointing. "She called me a name, mommy."

"What did you do?"

"What did *I* do?" Alma rose and faced the woman. "I found your boy assaulting my son and I chased him away. That's what I did!"

"Impossible," the woman replied. "His father and I believe in non-violence. We won't even let him watch those awful cartoon shows."

"I wouldn't know about that." Alma was aware of the other shoppers gathering

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at the two ends of the aisle. "All I know is that I found him yanking on my son's—" Sudden panic: *What do I call* it? "—my son's prosthetic."

"Prosthetic?" The other woman looked openly at what she had been eyeing surreptitiously. "What is it, some kind of boom box?"

"No. It's a sensory collator."

"You're Seakirt, aren't you?" It was another woman shopper, who had come up the aisle to eavesdrop. "I read about you in the *Enquirer*." She turned to the first woman. "Her son is retarded, so she hooked him up to a computer." Turning back to Alma. "It won't work, you know. Computers aren't really 'thinking machines.' All they do is crunch numbers."

"I know that. I—"

But the first woman drew herself up. "You allowed a retarded child to roam loose in the supermarket? What if he had hurt someone! What if he threw some sort of fit!"

Alma wanted to tell the woman that retardation was not like that. That being slow to process inputs and outputs was not the same thing as homicidal mania. But the woman was in no mood to listen. "It's only a prosthetic," Alma said, pointing to the computer. "Like your son's glasses."

"How dare you compare my son to . . . that!"

"Just remember, it was your son who threw the fit." She grabbed the shopping cart in one hand and Ethan in the other and pressed past them. Behind her she could hear the whispers. "It's just awful what she's done to him." "It isn't natural." "Computers are taking over everything."

When she checked out of the market, she told the manager to be sure to charge the other woman for the bag of candy her child had eaten.

There were pickets in front of the Janifer Institute for Electroneural Medicine: several clumps of them wielding placards and eyeing each other as warily as they eyed the tall metal-and-glass doors. Alma hesitated as she stepped from the parking garage down the block and she put her hand down by her side to stop Ethan.

"Whass wrong, mommy?"

"Hush." She backed up a hasty step and peered around one of the concrete support pillars. The protestors weren't actually marching. Some were leaning on their signs, drinking coffee. The four police officers standing between the protestors and the Institute chatted with each other or rocked back and forth on their heels as they watched the sign-wavers. They weren't expecting trouble, just nuisance; one more dull duty. The local Eyewitless Action News Team were already set up, but their cameras weren't running. The technical crew were having coffee and donuts while the on-camera personality put the finishing touches on his hair. Curious passersby, seeing the cameras and the protesters, had stopped and were waiting.

For her.

They were all waiting for her to show up, Alma realized. The protesters were

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going to stage something dramatic and visual for the evening news. If they got themselves on TV they would be real; their ideas would be worthy of attention.

At least, those ideas that could be compressed to slogans and symbols and sound bytes. END THE CRUELTY, declared one sign, and what did that have to do with her? Another sign bore a red slashed-circle superimposed over a picture of a computer. And, yes, she had been getting a lot of *that* lately. Not from her friends and co-workers—they worked with computers themselves—but from strangers who felt duty-bound to tell her what was good for her. On a third sign she could make out the word "blasphemy" but nothing else.

Alma hated them. Why couldn't they leave her alone? Why did everyone have to tell her what to do? She backed away from the pillar. "Come on, Ethan. Let's get back in the van. We're going home. We'll see Doctor Silverman some other day."

"Let me see," he said, and stepped forward with his wheely. Alma seized him roughly by the shoulders and yanked him back.

"Don't let them spot you," she told him. "They'll come and scream at us so they can get on TV."

"Can I be on teebee?"

"No. Stay with momma." She turned toward the minivan, but Ethan shook loose from her grip and broke toward the sidewalk, pushing his wheely ahead of him. "Ethan!" She tried to shout and not shout at the same time, so Ethan would hear her and the protesters would not. But there must have been something wrong with the wheely's audio circuits because Ethan did not pause. By the time he "heard" her it would be three seconds too late.

Before he could turn the pillar, Ethan ran headlong into a man coming the other way. The man grunted and reached out and grabbed the boy's arm. "Steady, there, fella," he said. Then he stooped and rubbed his shin where the wheely had struck him. "You should watch where you're going. You could hurt someone." He looked up. "You must be Alma Seakirt. I thought I saw someone peek out from the parking garage."

He was a short, dark man, about 90 percent normal size. His features—nose, ears, hands, feet—were small, but of mature proportions; as if he were the product of a pantograph, a scaled-down version of a full-sized man. Somehow, that seemed to concentrate his energies, so that he projected an intensity that normal-sized men could not.

Alma stepped toward him and yanked Ethan's arm from his grasp. "Touch my boy again and I'll call for the police."

He blinked and pulled his hand away, as if Ethan had suddenly become white hot. "Hey, don't get me wrong. I'm not a child mol— I'm not differently motivated sexually. I just wanted to talk to you for a moment."

"Your timing is off. The cameras aren't here yet."

"No one followed me. They think I left something in my car."

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Alma had taken two steps away, leading Ethan toward their minivan. She paused and turned back. "Why?" she asked.

He flushed, an attractive coloring against the dark, curly locks of his hair. "Not all of us are publicity hounds. I don't turn my convictions on and off for the cameras. I'll leave the posing to Gerald and Inga and the others at National. My impression is that you don't like confrontation, especially with a large group of activists."

"Is it."

"You had a judge issue an injunction to stop us from picketing at your home—"

"My God, you don't have to be a privacy freak for that! Everyone in the neighborhood was involved." And she had taken some heat from the neighbors herself, as if it were her fault that protesters threatened to disrupt their quiet little corner of the universe. Only Doc Wilkes, a retired G.P. who lived six houses around the block, had been sympathetic, calling her from time to time with words of encouragement. "So what?"

"So I wanted you to *listen* to what we have to say."

She hesitated, resenting the trap of reasonableness. It sucked you in. How could a fair-minded person reject anything without first studying it? Like those people who condemned movies they had never seen, or books they had never read. The ACLU had said that freedom of speech meant nothing if no one heard. And so by subtle steps the right to speak becomes the obligation to listen.

But she noticed that the other hadn't said that *he* wanted to listen to what *she* had to say. *Be reasonable* was always a one-way request. She had never heard of anyone pleading, *Please let* me *be reasonable*.

"Is something funny?"

She shook her head. How could she explain? She had no desire to plead her position to him and was not even sure what her position was. But he was good-looking in a miniature sort of way, and under other circumstances she would not have minded getting to know him better. "Sorry, I'd love to hear what you have to say, but I don't want to hang around. One of your friends out there could show up looking for you."

"Where, then?" he asked, fast as a panther.

"Where?"

"If not here, where do you want to meet me?"

Over drinks in a small, intimate bistro. . . ? Lord, what was she thinking? And what would she do with Ethan in the meantime? "One on one?" she said sharply. "No chanting crowds? No cameras?"

He nodded. "Just you and me."

Someplace where she could take Ethan along, like the public library? But if they met anywhere public, the vultures would gather. Someone would notice the boy, and the silent, whispering crowds would stare. And the picketers, cheated of their prey at the Institute, might well hear of it and be waiting, cameras and all, when she stepped outside. Mick had thought that the neural bypass would free her from

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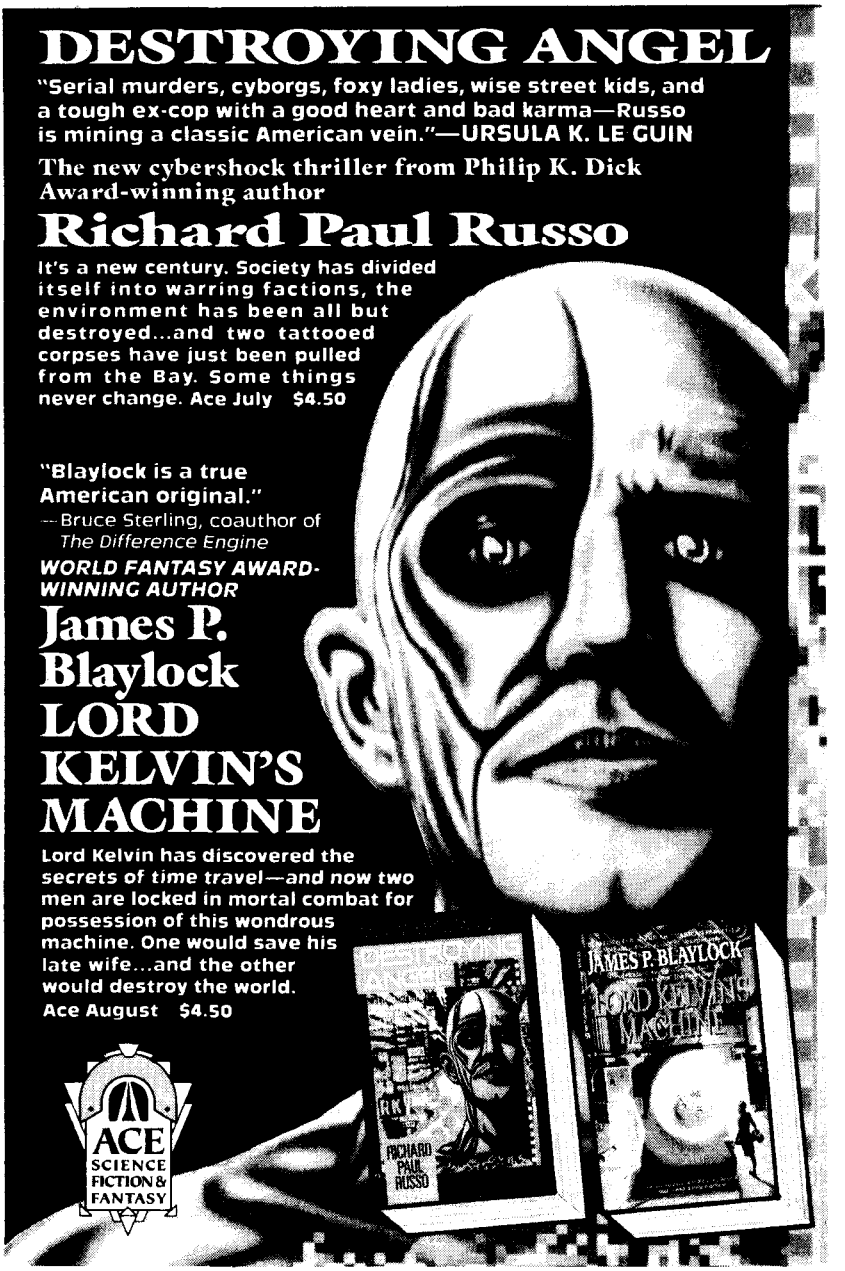

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Ethan. That was how much he knew! She wished he were here so he could see how wrong he had been.

Her house? Oh, God, no. She didn't even know this man. She was not about to put herself alone with him.

So, they couldn't meet public and they couldn't meet private. Which let her off the hook.

"I have a neighbor," she heard herself say. "He might let us use his house." She was as astonished as if a stranger had spoken, and could do no more than give him a time and an address.

She watched him get into his own car, a small, gas-efficient foreign make. No surprise there. In a large car, a Caddy or a Lincoln, he would have looked like a child. She started her van and put it into gear. *Why did I agree to this?* she wondered. She took the back street exit from the garage so the people in front of the Institute would not see her or recognize her van. A glance in the rearview mirror showed her that the little man was following. *I don't even know his name.* This wasn't right. Her life needed no more complications than it already had.

Doc Wilkes was a comfortable old gentleman who seemed as much a part of his house as the vines and flowerbeds. The wrinkles on his face were concentrated around the corners of the eyes and mouth, and his eyes took in everything with lively interest. Alma did not know him well; he was mostly a voice on the telephone, or a friendly wave when he jogged by her house with his Walkman. Yet, when she went to his door and made her strange request, he did not hesitate to agree.

Alma stepped inside to find herself surrounded by soft music: a quiet, bluesy tune she did not recognize. The sounds seemed to be coming from a room at the end of the hallway, but when she looked up she saw twin speakers in the wall. Doc Wilkes grinned. "It's a trick you can play with digital recordings. Musical ventriloquism. I have speakers in every room. I can even make different instruments sound from different directions, or seem to spin around you. Hello, there, little Ethan."

Ethan peeked out from behind Alma's skirts. "Hello?" he said uncertainly.

"He's a little shy around strangers sometimes."

Wilkes beamed and knelt in front of the boy. "I'll bet you don't remember me at all," he said. Ethan shook his head, but remained silent. "Never mind. You can call me Doc." He looked at Alma. "Who's your G.P.?"

"Doctor Khan."

He seemed startled. "Noor Khan? Is that a fact? I thought she had retired." He shook his head. "Well, some of us last longer than others." A strange, haunted look flickered briefly in his eyes. "Some of us last longer." Alma wondered what ancient hurt had been resurrected. "Well," he continued brusquely, "it's not how much time, but how well we use it. Noor Khan is a good physician; better than I

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ever was. Has she put any meat on those bones of hers, or is she still as scrawny as a crane?''

Ethan tugged at the old man's sleeve. ''Doc?'' He pointed. ''Who's makin' th' music?''

Wilkes turned his attention back to the boy. ''It's called *Careless Love*. Can you beat the time, Ethan? Like this?'' And he tapped a slow, syncopated 4/4 rhythm on the top of Ethan's wheely. Alma fidgeted.

''Can I tell this fellow he can come in, then? I want to get this over with.''

''What? You mean he's cooling his heels out on the porch? Of course, he can come in.'' Wilkes arose in a creaking of knees. ''That was very good, Ethan. He's much improved, Mrs. Seakirt. Much improved.''

Alma paused by the door and looked back at him. ''In most ways.''

She could see that he wanted to ask her what she meant, but he did not press the point. ''You can use the living room, off to the left there. I'll make myself scarce. If I stick around, your friend is liable to ask me what I think, and if he does, I'm liable to tell him.'' He chuckled. ''I'll take Ethan out to the kitchen, if you like.''

''No, thank you. He'd be too much a bother for you.''

''No bother at all.'' Doc took Ethan by the hand. ''Come with me, Ethan. We'll play some more games with the music. Hum along with me. Dáaa da dá da dáa d-dáaaa . . .''

Alma watched them go. Ethan would be all right. Doc was a doctor, after all, even if he was retired. And she would be right down the hall if Ethan needed her. Her feelings, as she opened the door, were a curious blend of anxiety and anticipation.

His name was Vinnie Patterson and he thought she had done the wrong thing.

''No one has the right,'' he explained earnestly, leaning forward over the coffee table that separated them, ''to profit from cruelty to others.''

She shrank back from his intensity into the high-backed, upholstered wing chair. ''What cruelty?'' she asked, remembering the placard she had seen waving in front of the Janifer Institute. On the table before her, her barely sipped coffee slowly cooled. Doc Wilkes had offered them both a cup but, when he turned to Vinnie, the man had responded with a short dissertation on the rape of the Brazilian rain forest. What must it be like, Alma wondered, to live a life in which every act was a political act, even the drinking of a simple cup of coffee. For all Vinnie knew, the coffee had been grown in Colombia, not Brazil.

But there was probably something objectionable about Colombia, too.

''What cruelty?'' Vinnie unzipped a black, vinyl carrying pouch and rummaged inside. ''The surgery that you put your boy through was tested on animals, wasn't it?''

''Chimpanzees.'' Alma remembered Silverman telling her that.

''Yes.'' He handed her an 8 × 10 glossy photograph. It was black and white,

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not quite in focus. A chimpanzee, lips pulled back from its teeth, mouth open in what had to be a cry, stretched its arms through the bars of a cage. The pleading eyes stared out at Alma. She looked back at Vinnie.

"Torture," he said. "Innocent animals tortured so that a few white males could become rich and famous."

"So that my son could function like a normal boy."

"The mentally challenged have the right to their own lifestyle. Would your child have a right to use this technology if it had been tested first on Jews? Or on blacks?"

"What? Of course not. That would be horrible." Images of sadistic Nazi death camp "experiments." People immersed in ice water. People cut open without anaesthetic. Just to see what would happen.

Vinnie leaned forward again, as if he were prepared to leap across the table. "Then why do you think you have the right to use technology tested on other living creatures?"

"But . . . they were only animals."

"Only animals." Vinnie shook his head. "Alma, a rat is a dog is a pig is a boy."

She reared back. "What does that mean? How dare you compare my Ethan to a rat!" Her mother had done that, she remembered. Beatrice had called Ethan a lab rat.

"No, no," he said. "I don't mean that Ethan is no better than a lab rat. I meant that rats—any living thing—has rights. That we humans are not entitled to use them as *things*. 'Anything that has eyes has a soul.' "

"Potatoes?" She couldn't resist teasing him, he was so earnest. "Laced shoes?"

For a moment, she thought she had offended him. His lips tightened and pulled back at the corners. But then, abruptly, he laughed. "Yes," he said, "as a matter of fact, shoes do have soles. Potatoes, I'm not sure about." She laughed with him.

"Sometimes," he continued, "we can take ourselves too seriously and forget how to laugh. But—" And the laughter bubbled away like flattened soda. "—would you have cracked a joke if we had been discussing women's rights instead of animal rights?"

I might have, at that, she thought. "No," she said.

"It's always wrong to impose human ideas on nature. And it's especially wrong to use them in research in some sort of mad quest for immortality. There are more benign ways of doing the research. Epidemiological studies. Computer models."

"That sounds pretty good, young fellow." Doc Wilkes stood in the doorway with a steaming coffee pot. "Animal rights. I never knew anyone in the medical profession who wanted to mistreat animals. Hell's bells. If the animals were mistreated, the test results wouldn't be valid. If ethics fail to show the way, self-interest will do." He walked to the table and glanced at Alma's still full cup. "Gone cold," he said. She looked away. For some reason, Doc made her feel uneasy.

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"Rights are a human notion," she heard him tell Vinnie. "There are no 'rights' in nature. Does the lion honor the lamb's rights? Or vice versa? No, sir, she does not. So what entitles us to impose our human ideas of rights onto animals?"

Vinnie stared at him. He opened his mouth and closed it. Then he said, "That's a trick argument. Inga has shown that it is immoral to—"

Doc waved an irritated hand. "Save your moral judgments for church. Don't try to force your beliefs on the rest of us."

Alma suddenly realized why Doc's presence made her feel uneasy. "Ethan!" she said, suddenly rising from the chair. "You left him alone in the kitchen!" She turned to push past him and her knee banged the coffee table, knocking the china cup over and sending a flood of cold coffee across the glassed top. Behind her she heard Vinnie's voice.

"I don't blame her for being alarmed, Doctor. Don't you realize how unreliable computers are? What if it bombed off while the boy was unsupervised? Suppose he was climbing off a chair when all of a sudden his senses. . . ?"

Alma didn't hear any more. She was halfway down the hall and saw Ethan at the other end staring at a photograph hanging on the wall: two old women, one of them a dwarf.

Yes, she thought suddenly. What if it *did* bomb off when she was not around? She had never really thought of that before.

The colors were bright and clear. And he could make them appear on the paper by rubbing the "crayon" back and forth. Rub-rub. But stay inside the circle. The crayons had a pleasant, waxy smell. Rub-rub. He had smelled that smell before. Rub-rub. But he had never connected the smell with the colorful little cylinders. It was wonderful. Did the different colors have different smells? He put down the brown one and picked up the green one and held it to his nose. He took a deep breath. Maybe. It was hard to be sure.

Alma watched Ethan from the corner of her eye as she washed the dishes. He sat at the kitchen table with a box of crayons and a sheet of butcher paper. He clutched the green crayon in his fist, and the tip of his tongue peeked from the corner of his mouth. The fist moved over the paper.

"Don't put the crayon in your mouth, dear."

Ethan blinked and looked at her, looked back at the crayon. He continued doodling. "No, momma."

Alma rinsed a plastic cup and set it in the drainer. "What are you doing, Ethan, dear?"

"Drawn a picher," he said without breaking his frown.

"Of what?"

"Jus' pichers."

"Pic-tures," she said, enunciating clearly. "Pictures have to be pictures of something, don't they?"

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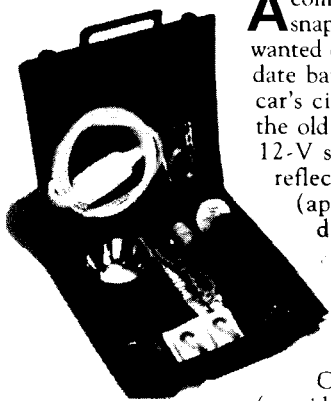

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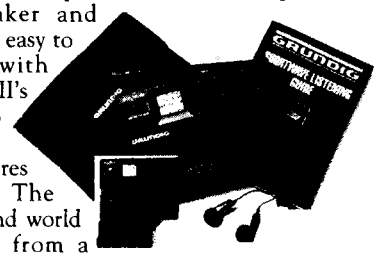

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He shrugged and hunched over the paper. "Doggie," he said.

"Do you want a doggie?" She hoped not. She couldn't take care of an animal besides.

"No. Jus' drawn doggie pik-churs."

"But a green doggie? Why are you making the doggie green?"

He stopped drawing. "I dunno."

"You can make the grass green. And the trees." She finished the last of the dishes and opened the drain in the sink. She dried her hands on a tea towel.

"Can I dry the dishsh—dishes, momma?"

"You might drop them on the floor, dear. You know how you still drop things sometimes."

"Plastick don't break. I can pickup." Pride in the voice. I can pick up.

"I know you can, Ethan, dear. And it's wonderful. But I would have to wash the dish over again after it was on the dirty floor. Don't you like drawing pictures?"

Silence. She looked over at the table. Had the computer bombed? She hung the towel on its rack. Honestly. She had had such hopes for Zachariah's implant; but Ethan still dropped things, and he was still slow to answer sometimes. It was a bother having to run the diagnostic program every morning and drag the computer with them everywhere—and the stares they received! Not that she minded. It was for her Ethan. Still, it *was* extra work.

Ethan slid off the kitchen chair and put the crayon box atop his wheely. He reached for the butcher paper.

"Where are you going, dear?"

"Bedroom."

"There's no table in there to draw on. I don't want crayons all over my bedroom. Isn't it much easier to draw at the kitchen table? You can show the picture to Uncle Vinnie when he comes here tonight."

"Sto'room?"

"You know the storeroom is full—"

"Make sto'room *my* bedroom?"

"Then where would I put all the things that are in there?" Sewing machine. Ironing board. Winter clothes in the closet. And never mind the bright, happy wallpaper that Nate had hung himself. The smiling birds and happy squirrels. That had been when they had planned to use the room for something else. When they had thought they could have plans. Before they had known how impossible that would be.

"You'll be able to do much better work out here. You have the table and the sunlight coming through the window."

Ethan threw the crayon box onto the table. The lid came open and the little wax cylinders rolled across the Formica surface. The red one reached the other side and fell to the floor.

"Ethan," she said. But the boy was already rolling his cart toward the bedroom. She shook her head. Most of the time his coordination was good, but every now

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and then something would screw up and Ethan would miss what he aimed at—as with the crayons just now—or he would fail to hear what she said to him. She should keep track of these glitches. Tell Zachariah. Maybe there was a bug in the software.

She bent behind the table and retrieved the fallen crayon. Then she sorted the crayons out into proper order and placed them back in their box. Ethan's drawing lay on the table. She picked it up and studied it. It was crudely drawn. Head and body were simple ovals. The legs were sticks. Both ears were atop the head; one of the eyes was outside the oval of the skull. Well, he was new to hand-eye coordination, and Picasso had become famous for work like this. Standing on a patch of green, the dog was brown after all.

She awoke that night from inchoate dreams into the darkness of her bedroom. What was it? What had woken her? A sound? Voices! Was it Vinnie? No, he had left early. She fumbled with the lamp on the night stand. Six o'clock? Something was wrong.

And Ethan's crib was empty.

He's roaming the house! She threw the covers aside and, clutching her nightgown tight around her throat, left the bedroom. They really should move to an apartment. Some place smaller. There was only the two of them. There would only ever be the two of them. Rattling around in a half dozen rooms, it was too easy to lose track of him. She should have let Nate keep the house in the settlement.

She found him sitting on the living room floor with a bowl of cereal. The television was on and the roadrunner was giving it to the coyote again.

"Ethan!"

He jerked as if punched and a brief scowl crossed his face. "Yes, momma?"

"What are you doing up alone?"

"Watchin teebee."

"You know I don't want you playing with the TV. It's dangerous. You could electrocute yourself."

"You play it." He cast his eyes down as he said it. Alma thought there was a hint of fear in his voice. Was he afraid that his mother would electrocute herself?

"Don't worry, Ethan. Grown-ups know how to work the TV without being electrocuted." She stooped and took his bowl and spoon. "Here. I'll take care of that. I don't want you spilling on the rug."

"No, I throw't out. Lemme. Can do't myself." He tugged on the bowl and it tipped and the milk splashed on him and on the rug. He froze and stared at the stain. Then he cried and hugged her. "M'sorry, momma. M'sorry. Din't mean to do't."

After a moment, she hugged him back. Was it going to be like this from now on? Waiting for the next random computer glitch? What if the next time he fumbled something it was not a bowl of milk and cereal, but something dangerous? What

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if the next time he failed to hear her advice in time it was a warning? She knew suddenly and clearly what she had to do.

Alma stepped into Doctor Silverman's office and was immediately struck by the number of people present. Silverman and Zachariah, of course. Zachariah looked especially distressed and his big, brown cow-eyes regarded her with puzzlement. And the thin, dusky woman standing by the bookcase must be the Institute's lawyer.

But Mick? What was he doing here?

Ethan wrested free of her grasp. "Uncle Mick!" he said, rolling across the room. Alma caught up with him just as Mick hoisted him up. "I missed you, Uncle Mick."

"And I missed you."

Alma seized Ethan under the arms and lifted him away. "Be careful," she told Mick. "You've got to remember how long the umbilical is."

She heard his voice over her shoulder as she turned her back on him. "Six feet, Alma. Six feet with a spring-loaded take-up reel. Plenty of slack for picking kids up and hugging them."

She turned and stared at him.

"Whose company did you think supplied the components?"

So, that was why he was here. An investment to be protected. Profits. "I should have known," she said.

She set Ethan with his legs dangling over the edge of the sofa and *(Flash on the day she had sat there listening to Doctor Silverman explain what it was she had to deal with)* she turned and introduced the man still standing in the doorway. "This is Sèan fitzPatrick, my lawyer."

"Not Vinnie Patterson?" said Mick.

There was an odd twist to his voice. She looked at him. "What, do you follow me around, Mick? That's sad. Get a life. I have. Vinnie . . . makes me feel good about myself."

"Right."

"What do you mean by that crack?"

"For God's sake, Alma. He looks like a kid."

"Who, Vinnie? What of it?"

"So. I suppose you've always wanted one."

She took two long steps across the room and slapped him. A long, roundhouse slap that started nearly from her knees. It rocked his head to the side. "How dare you!"

Silverman stood up from behind his desk. "Please!"

FitzPatrick laid a restraining hand on her arm. She looked at him and nodded and let herself be led to the sofa to sit beside a bewildered Ethan. "Mommy, why? What? Uncamick?" She hugged him hard around the shoulders, feeling the way the umbilical draped across her forearm. There, let them see for themselves that

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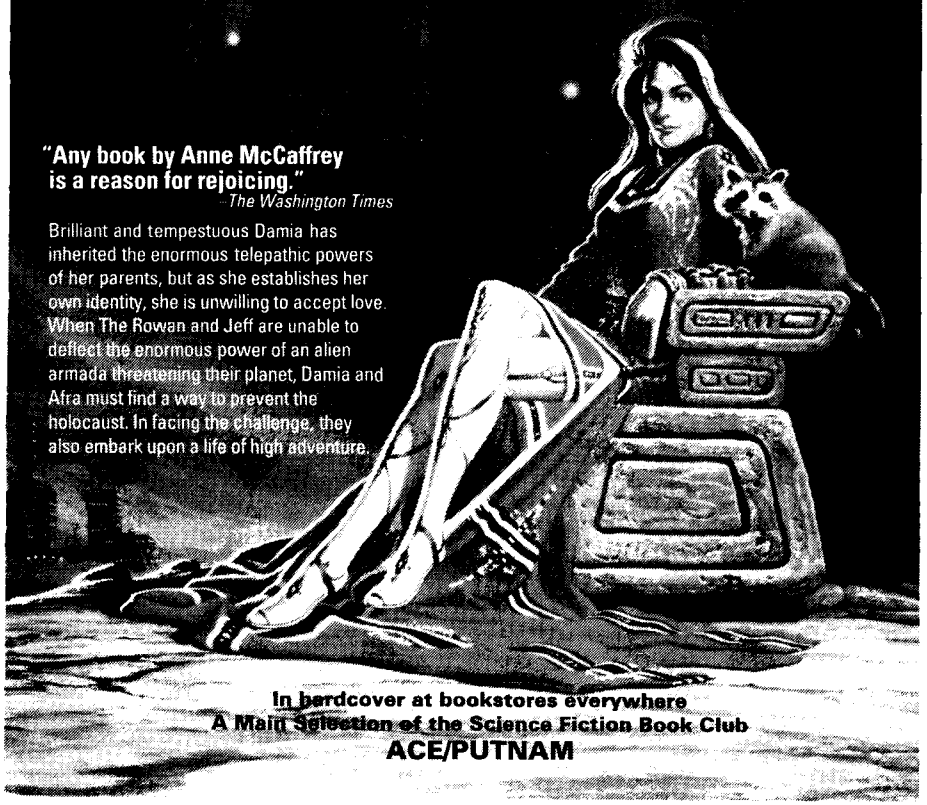

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the wheely did not always help Ethan process his sensory inputs. Sometimes they were still garbled. "This is business," she announced to the room at large. "Let's keep my social life out of it." She turned to the lawyer. "Sèan?"

FitzPatrick had dark brown hair threaded with white. His three-piece pinstripe suit fit him like a glove, it was so well-tailored. The creases on the trousers were sharp enough to slice cheese. Silverman favored the lawyer with a hard stare.

"We've spoken. On the phone."

FitzPatrick responded to Silverman's irony with a pleasant smile. "And had we settled the matter then, we would not have to have this meeting."

Silverman introduced the Institute lawyer as Antoinette daSouza. FitzPatrick gave her a three-fingered scout salute. "Hello, Nettie. It's been a while since we crossed swords, hasn't it? I haven't seen you down at Hogan's since D.A. Copperfield's retirement party."

"I've been back home to see my parents," she said, returning his handshake. She had an odd accent. Not quite Spanish. Brazilian, probably.

Hired guns, thought Alma. They didn't care about her Ethan *or* about the Institute. Tomorrow, paid by someone else, they would just as cheerfully argue the other side. Shake hands and come out fighting. It was the fighting that mattered, not the fight.

Silverman's first words were directed to her. "I don't understand, Alma. I don't understand, at all." Turning to face him, she seized her resolution and held it tightly to her. "What don't you understand, doctor? I want Ethan disconnected. Is that too hard to comprehend?"

Tom Zachariah was seated in a padded armchair beside Silverman's desk. He had his elbows resting on the arms of the chair and his hands were clasped into a ball under his chin. His eyes were troubled. "Why?" he asked.

Before she could respond, fitzPatrick laid a hand on her arm. "Mrs. Seakirt does not have to answer any questions. It is her decision not to continue the extraordinary medical treatment that her son has been receiving."

"But that is foolish," said Zachariah. He looked at Alma, but she would not meet his eyes.

"Irrelevant," said fitzPatrick. "In re *Maida Yetter,* citing *Roe v. Wade,* the constitutional right to privacy includes the right to refuse medical treatment even if the refusal is 'unwise, foolish or ridiculous.' "

"Alma can decide for herself if she wants medical treatment," Mick interrupted. "But is that what Ethan wants?" The mark of her palm stood out dull red against the pale skin of his cheek. *I shouldn't have slapped him,* she thought. *I shouldn't have given in like that.* It made her look foolish and hysterical.

FitzPatrick looked at Mick. "Being retarded, Ethan is incompetent under the law. A court would hear his preferences, but they would not be controlling. Alma Seakirt, as Ethan's parent, is entitled to make his decisions in his name."

"But the electro-neural transformer has reduced Ethan's retardation," Silverman pointed out.

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"True," fitzPatrick riposted, "but it does not make him any older. He is still under eighteen and still legally incompetent." He smiled at the doctor.

A lawyer's trick, thought Alma. A rhetorical ambush. FitzPatrick used words the way a fencer used a foil. What was it he had said to her when Vinnie had introduced them? *Among the Irish, conversation is regarded as one of the marital arts.* But he didn't have to look as if he were enjoying himself.

DaSouza spoke up. "The state also has *parens patriae* interests, Sèan, to look out for those who cannot look out for themselves. That's the basis for child labor laws and mandatory school attendance. In re *Mildred Terwilliger,* the court must consider only the interests of the incompetent person, and *not* merely the interests or convenience of the parent."

"*My* convenience?" said Alma. "My convenience? Do you know how difficult it is to—" FitzPatrick raised his hand palm out and she stopped herself. Yes, he was right. Why hire someone to argue your point and then argue it yourself? FitzPatrick knew what he was doing; and, at Vinnie's request, he was even doing it *pro bono.* Otherwise, the Institute might have been able to bully or trick her into backing down.

"The U.S. Supreme Court," fitzPatrick reminded daSouza, "held in *Parham v. J.R.* that simply because a parent's decision is disagreeable to the child or because it involves risks, the power to make the decision does not automatically transfer to the state. And a parent is *presumed* to be acting in the best interests of her child."

"*Parham* is federal law," said daSouza. "This will be tried in Orphan's Court."

FitzPatrick shrugged. "If it is tried, at all. State courts take cognizance of federal precedent on constitutional questions. Chief Justice Scalia—"

"Courts *have* appointed guardians to make the decisions in many cases," da Souza pointed out. "Parents may not refuse blood transfusions for their child's operation, for example—even where their religious beliefs are at stake. Nor may they refuse medical treatment for fetuses that remain viable after abortion. Besides, you're forgetting *Cruzan.* The State is not *required* to accept a family member's substituted judgment for an incompetent loved one!"

"Yes," fitzPatrick admitted, "but *Roe v. Wade* was not overturned with respect to the fundamental right to privacy. The examples you cite involve risk of death. In re *Green,* the court ruled that the state does not have *parens patriae* interest of sufficient magnitude to interfere with a parent's decision when the child's life is *not* immediately imperiled by his physical condition. So here the individual's liberty interest to refuse unwanted medical treatment—either for themselves or for their incompetent wards—is unaffected."

"Dammit!" Mick brought his hand down hard on the bookcase he had been leaning against. "What is the point to all this jawboning? Alma, it's *wrong* to take Ethan off that transformer. Ethan? Ethan." He stepped forward and stooped down to face the boy on the sofa. "Ethan, what do *you* want?"

Ethan took his finger out of his mouth. "I dunno."

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"Do you *want* to be disconnected from your wheely?"

Ethan scowled and looked down.

"Do you?"

Alma put a hand on his shoulder. "You don't have to answer him."

He looked up at her and smiled. "I wanna do what momma wants."

Mick's head jerked up and he looked from Ethan to her and back. "He doesn't know what he's saying."

"Which is why," fitzPatrick reminded them, "children are legally incompetent to make this sort of decision for themselves."

Mick looked at her and she stared back without flinching. "You've brainwashed him," he said. "You and that Vinnie Patterson."

She set her jaw. "Why, because he pointed out the dangers of relying on the transformer? Because I don't feel right about torturing animals?"

"No animals were 'tortured,' " said Silverman. "That photograph you sent us was not of one of *our* chimpanzees. It was a sick monkey in Gabon being taken to a veterinarian, and was restrained only to prevent it from harming itself. That photograph," he added darkly, "reappears from time to time, always out of context."

"And none of the diagnostic records show any evidence of computer malfunctions," said Zachariah. "Why not give as much weight to what did happen as to what *might* have happened?"

"No," said Mick, still looking her in the eyes. "I don't think those are your real reasons."

She gave him an indignant look and held it between them. "And what are my real reasons?"

Mick shook his head and stood up. He dusted off the knees of his trousers. "The jailor envies the captive's dreams," he said, looking at no one in particular.

She wanted to know what he meant by that, but did not want to give him the satisfaction of explaining. "No one questioned me," she said, and they all looked at her. Silverman, Zachariah, Mick, the lawyers. "No one questioned me when I agreed to hook Ethan up to that thing. Why do you question me now that I've decided not to continue? Do I only have the right to choose when you approve of my choice?"

"It's not that," said Silverman. "It's—"

"Bad publicity for the Institute," she said, ignoring fitzPatrick's attempts to silence her. "After all the big announcements, how would it look when your star patient wants to be taken off? That's the only reason you're fighting me."

Silverman shook his head. "Not the only reason. And a trial would be just as bad."

"Worse," said fitzPatrick. "That's why it won't come to trial." He cocked an eyebrow in daSouza's direction.

"No, they'll fight it, Sèan," Alma told him. "If I take Ethan off, there'll be a

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big stink on the newsnets. How will they ever get anyone else to sign up her child?"

Zachariah spread his hands. "Mrs. Seakirt, I admit that no one *wants* to fail—"

"Or at least not many of us," said Mick.

"But the success of this research project is not why I urge you to reconsider."

"The Institute operates for a profit," she reminded them. Vinnie had told her that. Greed for profits blinded people.

"Alma, we care about Ethan," said Mick. "All of us do. You're not alone. He's not a burden you have to shoulder by yourself."

"What do you know about it?" she snapped. "You ran out like all the others. You're not concerned about my Ethan at all. It's the profit you'll make from building these prosthetics for the Institute."

"Alma." He straightened, shoved his hands in his pants pockets. Looked down, looked back up. "Alma, if it will convince you otherwise, I will donate every cent of profit on those machines to any charity you name."

Taking Ethan by the hand, she stood up. FitzPatrick stood with her. "No, I'm sorry. My mind is made up." She walked to the door, the lawyer trailing behind her. "I coped with Ethan for years before the operation. I can cope with him again."

"We'll fight you on this," said Mick. "We'll have the court name a guardian."

FitzPatrick nodded. "See you in court."

As she stood in the half-open door, Silverman spoke up. "One thing, Alma." She looked back at him. "The decisions are not easy, and you never, ever know if you are right. But if you do go ahead, it won't be like it was before."

"Why not?"

"Because he'll remember."

Her skin tingled, and for the oddest moment she felt as if she were encased in glass and everyone in the room beside herself and Ethan were far, far away. Then the moment passed and Ethan tugged at her skirt and she looked down. "A' we goin now, momma?"

She knelt and hugged him, untwisting the cord with a practiced movement. "Yes, we're going now. And momma will take care of you forever and ever.

"Will ev'ythin be awright?"

She brushed at his clothes and hair, straightening any sign of disarray. "Oh, yes. Oh, yes. You know I only want what's best for you." ■

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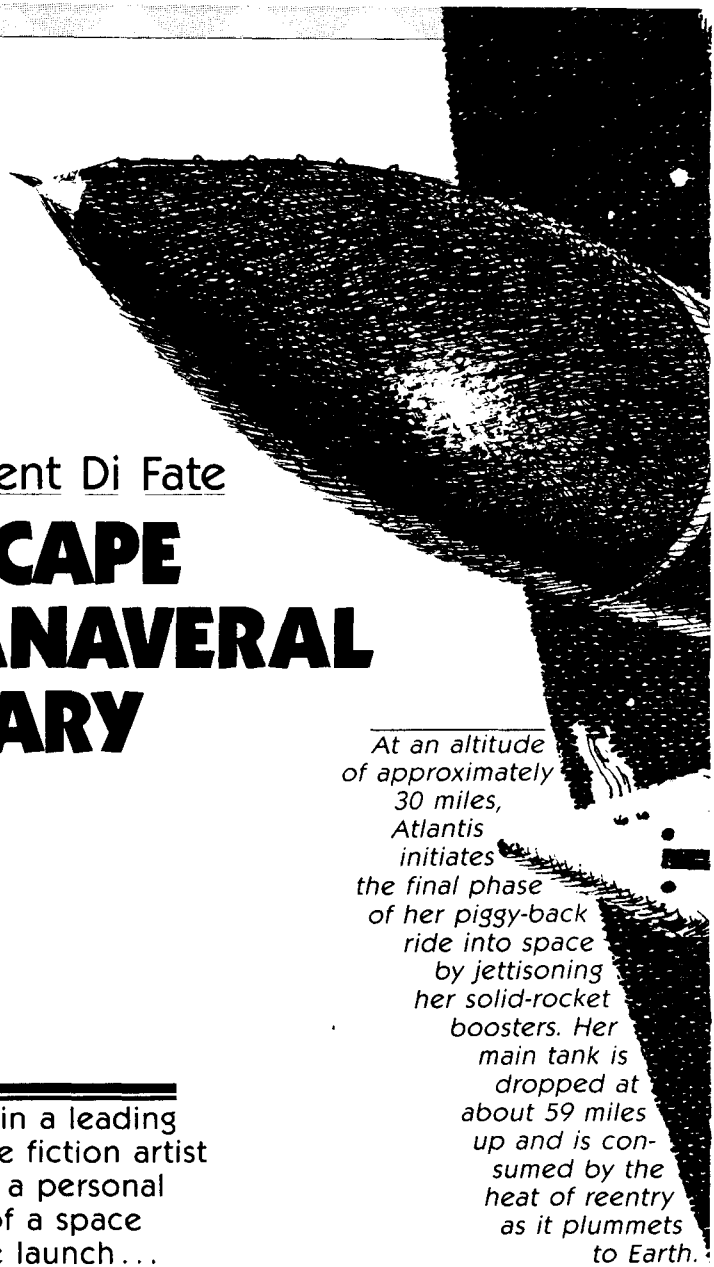

Vincent Di Fate

A CAPE CANAVERAL DIARY

At an altitude of approximately 30 miles, Atlantis initiates the final phase of her piggy-back ride into space by jettisoning her solid-rocket boosters. Her main tank is dropped at about 59 miles up and is consumed by the heat of reentry as it plummets to Earth.

Wherein a leading science fiction artist shares a personal view of a space shuttle launch . . .

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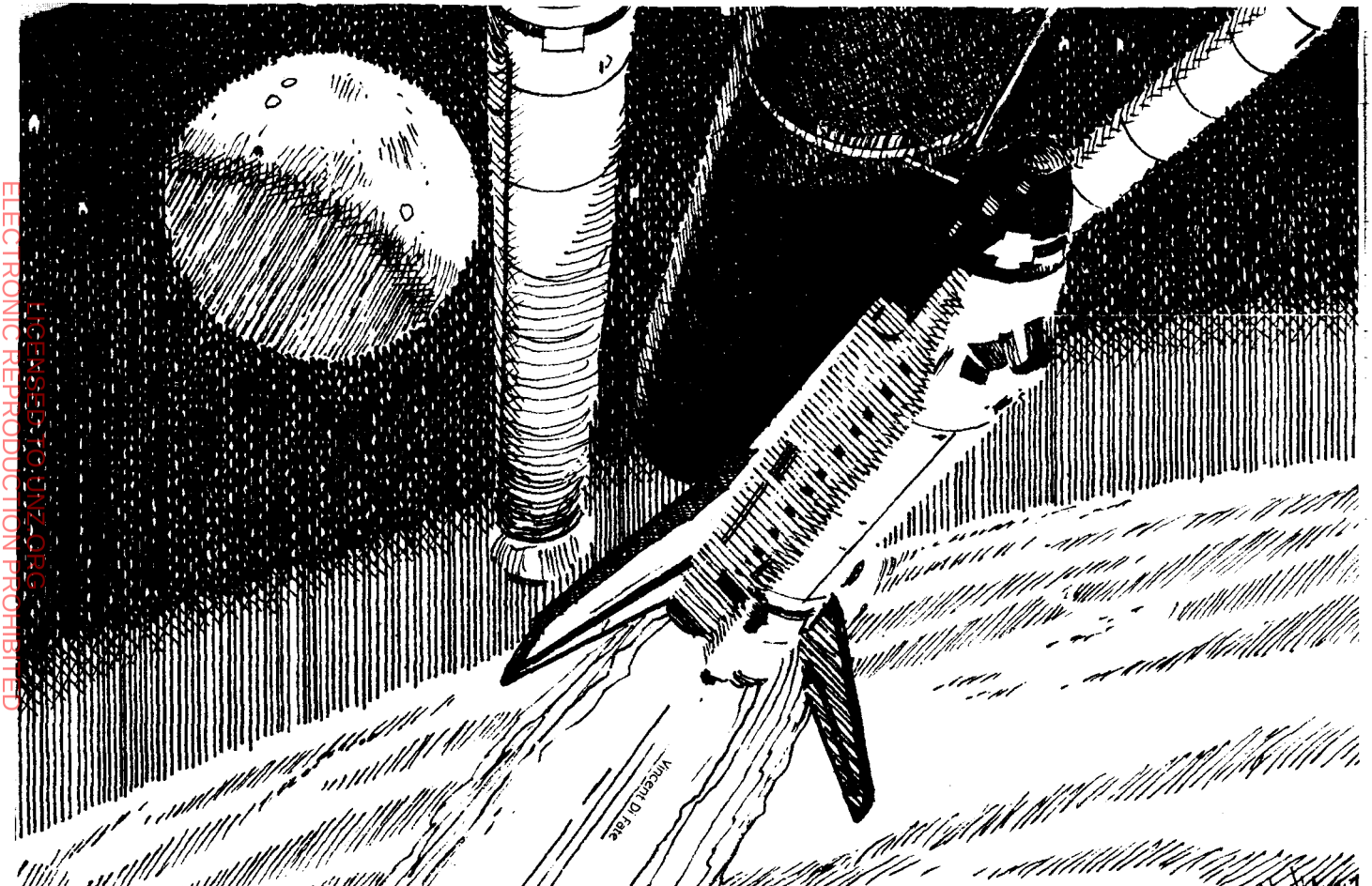

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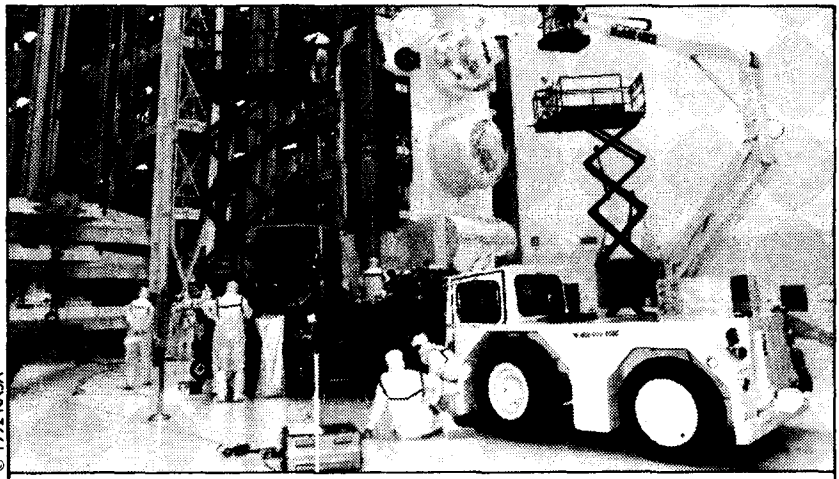
Wappingers Falls, New York—
April 2, 1991

After seeing the kids off to school, my wife Roseanne and I took a walk at about 7 A.M. In Merrywood Road, just a few dozen yards behind our house, we encountered some deer who froze in their graceful passage across an open field when they saw us. I was struck by the simple elegance of these creatures, knowing that a few hours later I would confront far different wonders.

Twelve hundred miles down the Atlantic Coast, five human beings were preparing to be thrown off the Earth's surface into an orbit some 243 nautical miles up for a mission which was expected to last five days. Among the objects being borne into space was the Gamma Ray Observatory which, at a formidable weight of 35,000 pounds, could perform a series of scientific functions of which I had only the vaguest comprehension.

From April 2 through 5, I was on assignment for the National Aeronautics and Space Administration to create artwork which would document the preparation and launching of the Orbiter *Atlantis*. I was one of six American artists selected to provide a visual record of these events—each of us chosen from among thousands of potential candidates on the strength of our differences in interpretational approaches to provide the broadest diversity of images within the budgetary limits of NASA's fine arts program. For a program which had attracted the participation of such revered American artists as Robert Rauschenberg, James Wyeth, and Norman Rockwell, clearly the commission



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Technicians prepare the Gamma Ray Observatory for loading into the Orbiter *Atlantis*. Sixteen feet wide by 25 feet long, the observatory, weighing more than 15 metric tons, is the heaviest scientific payload delivered into low Earth orbit by the space shuttle.

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fee was the least important reason why thousands are drawn to it. Indeed, to have a front row seat at the greatest adventure in human history was reason enough.

Atlantis's April mission, designated by NASA as Space Transport System Mission 37, was to perform a series of scientific experiments and to place into Earth orbit the Gamma Ray Observatory (GRO). A complex and highly sophisticated bit of space hardware the equivalent in size of an over-large living room, the GRO is the second of four proposed space observation facilities, the first having been the Hubble Space Telescope which was launched almost precisely a year earlier. The two remaining observatories, the Advanced X-ray Astrophysics Facility (AXAF) and the Space Infrared Telescope Facility (SIRTF), are scheduled for launch in 1997 and 1999. To conduct several of the scheduled experiments and to aid in the deployment of the GRO, an EVA (Extra-Vehicular Activity) was planned for mission specialists Jay Apt and Jerry L. Ross—the first American EVA since 1985. For a life-long science fiction reader and space enthusiast like me, this assignment was a dream come true. And if the truth be known, I would gladly have paid NASA for the privilege of being there.

Despite my enthusiasm for the assignment, this was not my first commission for NASA under the fine arts program. In July of 1975 I participated in the documenting of the Apollo-Soyuz Test Project mission (a joint undertaking of the United States and the Soviet Union); and again in 1987 I was commissioned to create a painting of the proposed Space Station, *Freedom*. Coincidentally, a component of Space Station *Freedom* was to be tested during the STS 37 mission, the Space Station Heatpipe Advanced Radiator Element (SHARE II). Each of these experiences was unique, and together they provided me with some interesting comparisons. They also, in a sense, made me the senior artist in our group by virtue of prior experience.

My plane departed Stewart International Airport in Newburgh, New York at 11:30 A.M. Stewart, located on the site of a former Air Force facility, possesses one of the world's longest runways and is a back-up landing pad for the Orbiter. My trip began with a commuter plane ride to Philadelphia, where I connected with a flight to Orlando International Airport in central Florida. Aside from some rough going on the commuter run, the trip was uneventful. During the van ride from the airport out to the Holiday Inn in Cocoa Beach, where I was to rendezvous with the rest of the NASA art team, I spoke briefly with a retired school teacher with whom I shared a bench seat. She had done her student teaching in the late 1940s in Bronxville, New York, not more than a mile or so from where I grew up. As is often the case when I travel, the conversation quickly evolved into one of those "isn't it a small world" kind of exchanges where we compared notes on mutual acquaintances and common haunts. It did seem ironic that some 40 years later and 1,200 miles from home

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we should meet in a van headed out to Cocoa Beach. Certainly such a meeting could not have been possible in the days of Thomas Edison.

At one point she asked about the purpose of my visit to Florida. When I told her about the commission she seemed suitably impressed. It struck me then that my being there was purely a matter of dumb luck, for surely there were better choices than I. Particularly as a science fiction artist, there must have been some question about the seriousness of my commitment to "art." To many of the uninitiated, science fiction will never seem anything more than frivolous reading for the addle-minded. How little trust contemporary human beings place in their dreams—yet without those dreams there would be no airplanes, or telephones, or the thousands of common devices about which we build our entire lives in the contemporary world.

Upon my arrival at the hotel, I telephoned Robert Schulman at his room as instructed. Schulman, NASA's chief of Public Affairs and the man solely responsible for the selection of the art teams, asked that I join him and the other artists in his room at 7 P.M. for an informal briefing. Due in large part to Bob's outgoing nature, the seven of us hit it off well right from the start. We were all in Schulman's debt, not only for selecting us and for being the perfect host and raconteur, but for keeping alive the fine arts program with dogged determination through NASA's roller-coaster ride of budget cuts over many years. He believed, as we all did, that the artist brought to the documenting of these historic events a perspective and a sensitivity of which the camera was incapable.

Cocoa Beach, Florida—April 3, 1991

We met at the hotel restaurant for breakfast at 6:45 A.M. in the hope of having a quick meal and getting out to the Visitors' Center to view a newly installed mock-up of the Orbiter before the morning crowds began to assemble. Known as Spaceport USA, and greatly expanded from my visit for Apollo-Soyuz, the complex is operated by TWS under contract to NASA. The center now includes a museum, an art gallery, an IMAX movie theater, several exhibit areas, a cafeteria/snack bar, and a souvenir shop. With an average of about ten thousand visitors a day, the center is the fourth largest tourist attraction in Florida.

We were taken aboard the Orbiter mock-up by a guide who provided access to us above and beyond what the average tourist was privy to. While visitors could clearly view all that we were shown, they did so through a Plexiglas barrier which ostensibly reduced wear and tear on the exhibits. Traversing a catwalk through the 60-foot-long cargo bay, we entered the crew's quarters through a door in the bulkhead which would clearly not have been there in the genuine article. While the exterior dimensions of the ship were huge—the Orbiter is 122 feet long with a stunted wingspan of a little over 78 feet—the crew's quarters were remarkably cramped and quite spartan. Compressed

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"It's mad, it's glorious, it's hilarious."—*Locus*

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THE QUEEN'S SQUADRON

By R.M. MELUCH

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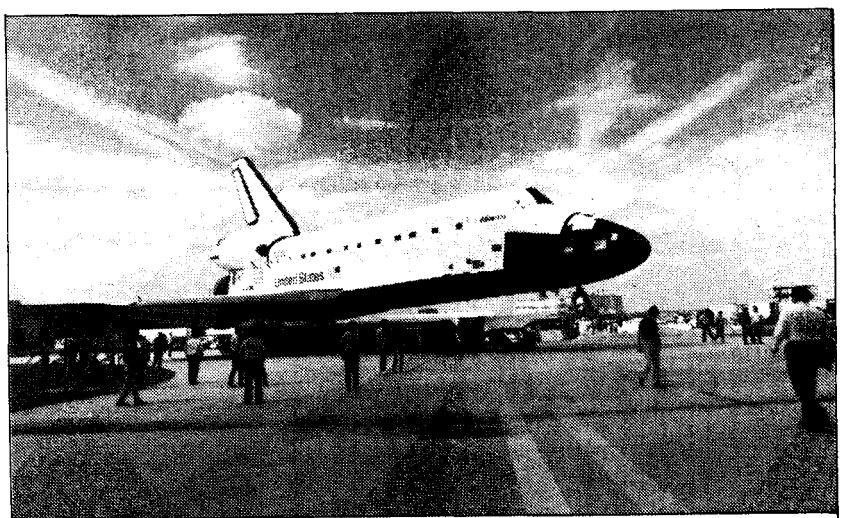
into the relatively small space were the bunks, showering facilities, an airlock which accessed the cargo bay, and a wall of instruments which took up the entire space just behind the ship's nose. I remarked how it reminded me of the destroyer escorts I was assigned to during my hitch in the Navy and, pointing to a ladder up to the flight deck, how we never had such a luxury, but rather used hand holds to pull ourselves from one deck level to the next. I didn't realize until sometime later that the ladder was in place purely for the benefit of those who needed to move about the ship in the presence of gravity. Under "normal" circumstances the crew simply floated up to the flight deck—and even that was cramped and designed to optimize space in zero gravity. To sit in the cockpit one floated over the top of the seats. Even the instruments were recessed behind metal frames to allow the crew to stand on them without interfering with their operation as they moved about in the confined space.

By 9 A.M. we were on our way by bus to the launch complex. *Atlantis* towered above Launch Pad 39B as it stood readied for the start of its mission just two days off. Less than 3,000 yards away on Pad A, the Orbiter *Discovery* was also being prepared for launch later in the month. The two ships perched on their Mobile Launcher Platforms and obscured on two sides by both Fixed (FSR) and Rotating Service Structures (RSS), looked like something off the cover of *Astounding*. Their rust colored External Tanks (ETs) and the white



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The Space Shuttle *Atlantis* is transported from the Orbiter Processing Facility to the Vehicle Assembly Building for mating with its external tank and solid rocket boosters in preparation for launch on April 5, 1991.

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cone-shaped tips of their Solid Rocket Boosters (SRBs) were the only recognizable objects in the vast maze of spindly, complex structures. Once painted white, the External Tanks are now left their natural color to reduce the weight at lift-off by some 750 pounds. The ETs alone, at a length of just over 154 feet and a diameter of 27½ feet, weigh nearly 1,700,000 pounds at launch. The total package of the Orbiter, its tank and boosters, has a gross weight at lift-off of about 4,500,000 pounds. Formidable as that is, the ship and its associated hardware is little more than a fancy firecracker when compared to the *Apollo/Saturn V* Moon Ships, which weighed nearly 2,000,000 pounds more and stood twice as tall, about the height of a 36 story office building.

After 20 minutes of photographing *Atlantis* from a few dozen yards away, we were transported to the perimeter road to sketch the ship from tankside. From our new vantage point we could clearly see the concrete mound, or Hardstand, on which the pad is mounted. Cut 42 feet deep into the Hardstand, and out of view of our group, was a flame trench 450 feet long by 58 feet wide into which the Orbiter's exhaust blast would be fired. To suppress the sound and reduce the heat of lift-off, the trench is flooded with 300,000 gallons of water. The vaporizing water accounts for the huge clouds which overflow the pad and surrounding terrain during launch.

Over lunch I mentioned my previous trip through the Vehicle Assembly Building (VAB) to the rest of the art team, as it was our next scheduled stop on the day's itinerary. The VAB is one of the world's largest structures by volume, and is the subject of numerous myths. In 1975, for instance, I was told that its interior was so vast that a complex air circulation system was constructed to prevent rain from occuring within it. The skepticism of my fellow travelers was such that one of them confronted Bob Schulman, and our field guide Bill Underwood, with my story and they not only confirmed it but went on to say that some birds—like the legendary alligators of the New York City sewer system—lived their entire lives without ever seeing the outside world. Fog, they added, was often seen forming in the upper rafters of the building.

If you've read about the VAB before, then you've heard how impossible this cavernous structure is to describe. Looking straight up from its concrete floor, the building's perspective flattens, looking unconvincingly like a matte painting in a bad science fiction movie. The structure covers eight acres of land and encloses 129,428,000 cubic feet of space. Incredible objects are assembled there like the playthings of Homeric gods.

Built originally for the assembling of the *Apollo/Saturn* ships, the VAB has since been modified to accommodate the orbiters. In assembling the various components of the ship, integrated solid rocket booster segments are brought into the VAB and mounted onto a mobile launcher platform in the High Bay section of the building where their construction is completed. The External

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Tank, brought in by barge, checked out and stored nearby in either High Bay 2 or 4, is then attached to the SRBs. The orbiter, towed in from the Orbiter Processing Facility just west of VAB, is lifted vertically by two 250-ton bridge cranes and lowered onto the mobile launcher platform, where it is mated to the components already in place. A crawler-transporter then enters the High Bay area and the platform, with its parcel of assembled spaceship, is lifted onto it for passage out to the launch pad. With the weight of its burden slowing its movement down to about one mile per hour, the transporter takes about five hours to reach its destination.

At 3 P.M. we returned to the Visitors' Center for a leisurely walk through the art gallery and a screening of a film at the IMAX theater. Over dinner at a restaurant just a few blocks from the hotel, we talked shop and a few of us continued our conversation in the hotel parking lot until the small hours of the morning. Perhaps we were awed by the events of the day, or were anticipating the wonders yet to come. In any case, none of us would look again with indifference at the events which took place here.

Cocoa Beach, Florida—April 4, 1991

By 9 A.M. we were fed and back at Launch Pad A for another session of photos and sketching. This time we took up a position near some railroad tracks, just a stone's throw from an immense tank of liquid hydrogen. During our session we had a local visitor, an alligator, who swam up to our group to check out our activities. Obviously curious, but not foolhearty enough to venture up on land, our visitor soon grew bored with us and went off, presumably to scare up a late morning snack.

By 11 A.M. we were standing in the shadow of one of the complex's two crawler-transporters, just under a muffler the size of a Cadillac hanging from the crawler's undercarriage. The crawlers, again often described but impossible to appreciate until seen at close range, are 131 feet long by 114 feet wide, and weigh 6,000,000 pounds each. Believed to be the largest tracked vehicles on Earth, the crawlers stand about two stories tall and burn approximately 150 gallons of diesel fuel per mile traveled. They are engineered to keep the orbiters vertical to within plus or minus ten minutes of arc (at the ship's highest point—the tip of the external tank—that's about ten inches to either side of straight up!), even while negotiating the 5% grade up the ramp of the hardstand to the launch pad. They move back and forth along a specially constructed road called a crawlerway, which is made up of graded lime rock, selected fill, an asphalt sealer, and river rock to cut down on road surface friction.

After lunch at the KSC Headquarters cafeteria we proceeded to the Orbiter Processing Facility (OPF), where the *Columbia* was being reconditioned for her next mission. Walking a long corridor in the OPF to the security station we passed a number of offices and hallway bulletin boards. On one of the boards was a gag photo of Saddam Hussein

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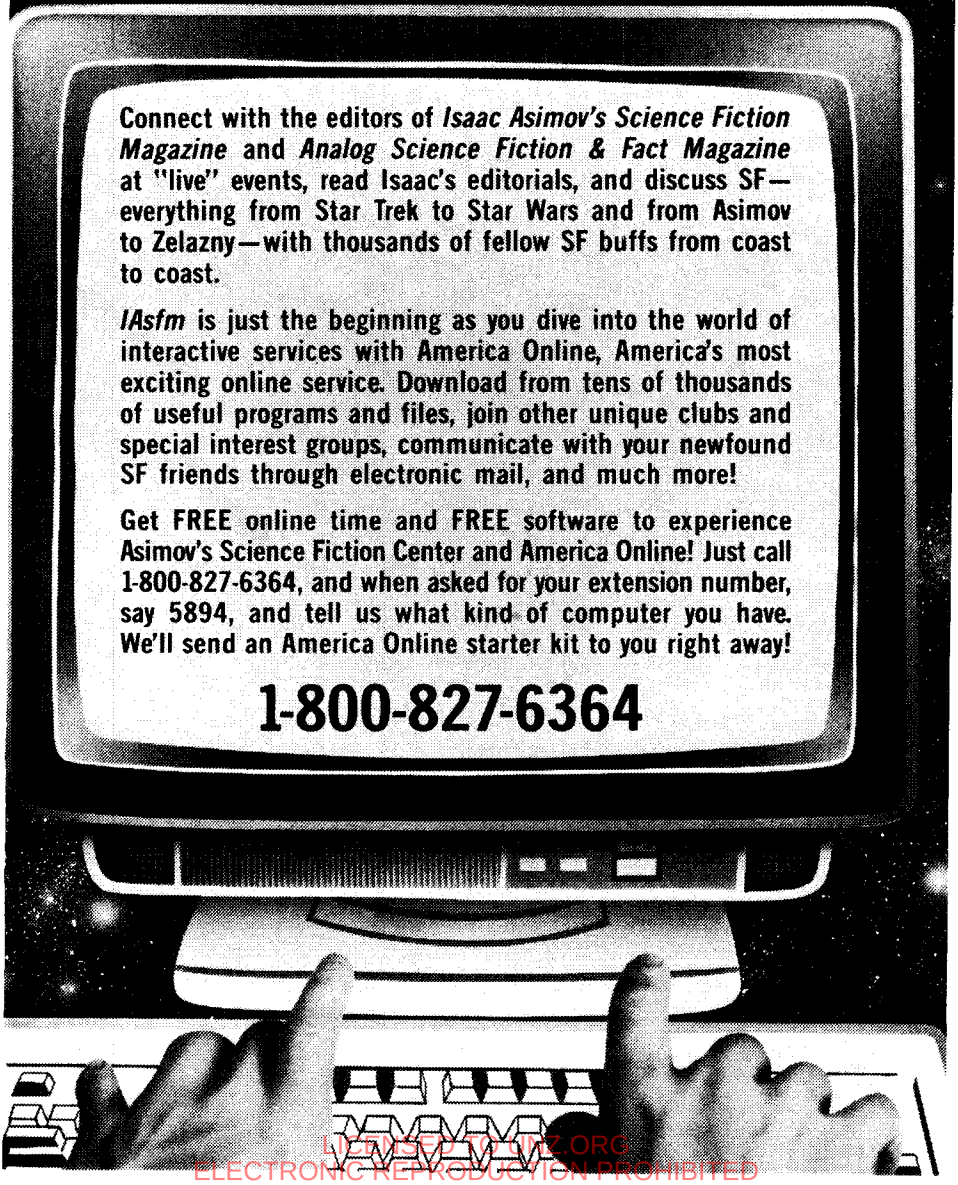

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The Crawler-Transporter is the largest known tracked vehicle on Earth. Weighing 6,000,000 pounds, it takes five hours to traverse the five-mile road from the VAB to the launch pad.

with a bull's eye printed across his face. Farther on, through an open office door we could see a reproduction of Rudolph Zallinger's famous dinosaur mural from the Peabody Museum at Yale (known to most of our group from its appearance in *Life* Magazine, back in the early 1950s). Hung off in a far corner, and recognizable only to myself, was a page torn out of a recent calendar of mine with a cover painting I'd done some years ago for *Analog*. This curious merging of past, present and future worlds registered somewhere in the back of my mind. Surely these items bore evidence to the fact that the folks at NASA were people with hopes and dreams and fantasies—not the goal-oriented automatons one might initially imagine.

Once past the security station we came within touching distance of the *Columbia*, and in fact spent most of our time in the OPF standing below the ship's underbelly watching technicians replace damaged and missing tiles near the tail section. The tiles are remarkably lightweight and have the consistency of pumice or Styrofoam. Absolutely critical to the orbiter's survival during reentry into the Earth's atmosphere, the tiles are meticulously checked and damaged tiles are carefully replaced and aligned to insure the safety of the crew and their vessel. Our guide, a pleasant young fellow the size of a refrigerator, told us

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that the heat of reentry was such that the ship's markings needed to be periodically retouched. When asked how this was done, we were told that most of the markings were applied through a stencil, but that the American flag, and particularly the stars, were put on by a technician directly by brush. The difficulty is that the paint used has the thickness and consistency of tile caulking.

Once through the OPF we were shuttled over to Operations and Checkout (O&C) where the *Columbia*'s mission payload was being readied in the building's West End White Room. The O&C, at five stories and 600,000 square feet of work space, is the largest building in the Industrial Area just beyond the VAB. Once utilized for building and testing Apollo spacecraft, the facility's large horizontal space is now mainly devoted to payload preparation of the European-built Spacelab. In order to enter the White Room area we were asked to insert our shoes into a device which rubbed the shoes clean and then we walked across a tack mat which, like a gigantic sheet of fly paper, removed any residual dust which might have remained on the outer soles. Entry into the White Room was the closest thing in the entire experience to entering an alien environment. The room, immense and entirely white, was populated with scientists and technicians decked out completely in white jumpsuits and hair nets. Many who were in close contact with the payloads wore face masks. The contrast of color against stark white gave the scene a surreal and eerie quality. As we continued our trek across the floor of this vast space, we passed a woman in a lab coat to our right who carefully wrapped a long rectangular object in vivid pink foil. Farther along we passed a bay off to our left where a team of Italian scientists conversed in their native tongue, gesticulating expansively as they gathered around an object that could best be described as a huge steel meatball.

After exiting the O&C at around 4 P.M., we opted to return to the Visitors' Center rather than to follow up with another visit to Pads A & B as indicated in the day's itinerary. When we arrived we were taken for an advance peek at the Astronaut Memorial which was to be unveiled for the public on May 9th. The memorial, a huge granite monolith some 42 feet high by 50 feet wide, contained the names of 14 astronauts who perished in the line of duty. Tragically, a few days later a fifteenth name would be added, that of Manley "Sonny" Carter, a veteran of the Orbiter program who died in a commercial plane crash while en route to give a talk to a group of students. Although it was difficult to envision how the memorial would function when completed, the sight of it brought home the idea that space exploration was indeed a dangerous endeavor. I thought of the shuttle crew sitting up there high on the back of a huge orange bomb waiting to be exploded from the Earth into the cold vacuum of space. As a nation we've come to be somewhat jaded about our successes in space and complacent about the seemingly routine nature of the space program. I paused to read the list

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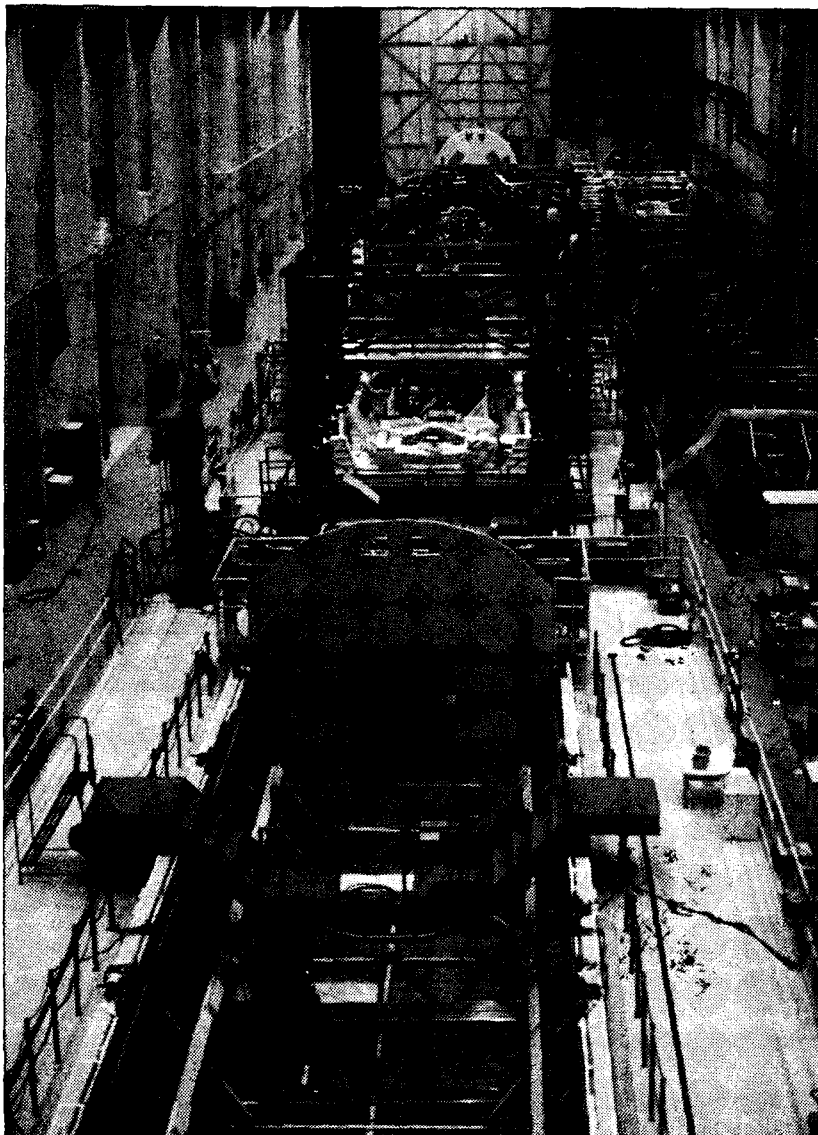

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An overhead view of the huge West End White Room of the Operations and Checkout Facility. Here components of the European built Spacelab are being readied, as well as other payloads requiring horizontal assembly.

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of names which would eventually be mounted into the monument—the seven *Challenger* astronauts; the three from the fire in Apollo I; the four who perished unheralded in crashes of T-38 jets back when the program was in its infancy. They said the monolith, called "Space Mirror," could move and track the Sun and that the sunlight would somehow reflect those names into the sky. I couldn't imagine how such a thing could be done, yet here I was in a land where the impossible was merely a matter of routine. There, in the shadow of that great black slab, we were suddenly reminded that anything that could be imagined could be made to happen, but that for such miracles there was a price.

The experience at the monument had been humbling. For a time we separated, seeking whatever diversion we could while we passed the remaining hour or so until our bus would take us back out to Pad 39B for the evening light-up of the ship. Sometime around midday the Rotating Service Structure had been rolled back and the *Atlantis* would be clearly visible. The evening light-up ceremony was devised mainly for the benefit of the press and promised to be impressive.

The bus brought us around to a position alongside Pad 39B just across the Banana River from the ship. The *Atlantis* stood in profile, its pristine hull gleaming against the gray and orange sky. By half past six four bus loads of journalists, cameramen and NASA employees stood among us along the bank of the river, just a few feet off the perimeter road as the evening winds whipped across us. About that time the first bank of spotlights went on, cutting the night with white shafts which turned the deep shadows on the Hardstand an eerie shade of green. *Atlantis* loomed above us, its contours etched against the night by the spotlights as the sky above turned black. As the evening progressed and more spots were turned on, the sky was crisscrossed with shafts of the cold, white light. From across the river the crowd, once abuzz with chatter, fell silent. There was a sense among us that some bizarre religious experience had taken place; an experience which would leave none of us unchanged. After an hour we were ushered around to the front of the pad to where we had been the day before. *Atlantis* towered above us, filling the night with her presence.

It was impossible for me to sleep that night. Before we split up for the day we agreed to meet at 5:30 A.M. at the hotel dining room before heading out to the press site for the launch. At about a quarter to six the crew, which had been sequestered the whole time we were there, would be transported by car out to the launch pad. At one point they would be crossing the main road leading to the Kennedy Space Center and the highway would be blocked off to traffic. To avoid the back up—and the eventual crowds which would line the roadside to witness the launch—we would have to arrive before or just after the crew made its passage out to the launch pad. Exhausted from the day's activities, we agreed during dinner that meeting later would be better than sooner.

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Cocoa Beach, Florida—April 5, 1991

At around 3 A.M. it began to rain torrentially, putting an end once and for all to my efforts to get some sleep. I showered, shaved, and dressed; by the time I was done the rain had subsided to a drizzle. I made my way out to the restaurant around five and, finding it closed, I took refuge under the carport to await the arrival of the rest of the team.

Bob Schulman was the first to show up, as had been the case every morning since we'd arrived. We talked briefly about what would happen in the hours ahead and eventually worked our way around to discussing the public's perception of the space program. Bob was clearly disappointed by how little interest there was these days—how there had been 34 buses out to the pad for the evening light-up of the first mission following the *Challenger* explosion, whereas last night there had been only four. He said his office had issued a booklet about the program spin-offs and if the public knew only a little bit about what was in it—how the program had literally changed the lives of virtually everyone on Earth—they'd better appreciate what was being done here.

I told him that I knew something of the program's spin-offs—perhaps not a great deal, but certainly enough. I told him how 23 years ago when I was just beginning my career, my wife had been diagnosed as having a form of cancer called Hodgkin's Disease and how she'd been given only three months to live. Of the possible means of treating her illness, the most radical was a form of radiation therapy which bombarded the body with highly accelerated particles to destroy the tumors. It was also the one method most likely to yield results at her stage of the disease. Much of what was known about body tolerances to radiation had come out of research from the early space program. That was 23 years and two kids ago. Did I know about program spin-off? I knew all I needed to know.

In that moment as I was talking to Bob, it seemed that almost everything in my life had suddenly added up to the rightness of my being there at that particular time and place. I thought about the first science fiction movie I'd ever seen, *Rocketship X-M*. That was in 1950, and at the age of four I knew the word rocketship and yet had not encountered the concept of the airplane. I remembered my first issue of *Astounding*, which, at age ten, I could hardly comprehend. What was true of me was true of many others in my generation: we'd grown up with the idea that space travel was a part of what the future held in store for us. Our fathers dreamed of touching the stars and through their determination to do so, that was fast becoming a reality. Somewhere between mine and the following generation, the dream had somehow got lost. Whether or not it stayed lost depended largely on what those of my generation could do to keep the dream alive. The dream is not only one of exploring space, but of building a better world for our children than the world we and our forebearers knew.

We arrived at the press site by 6:30

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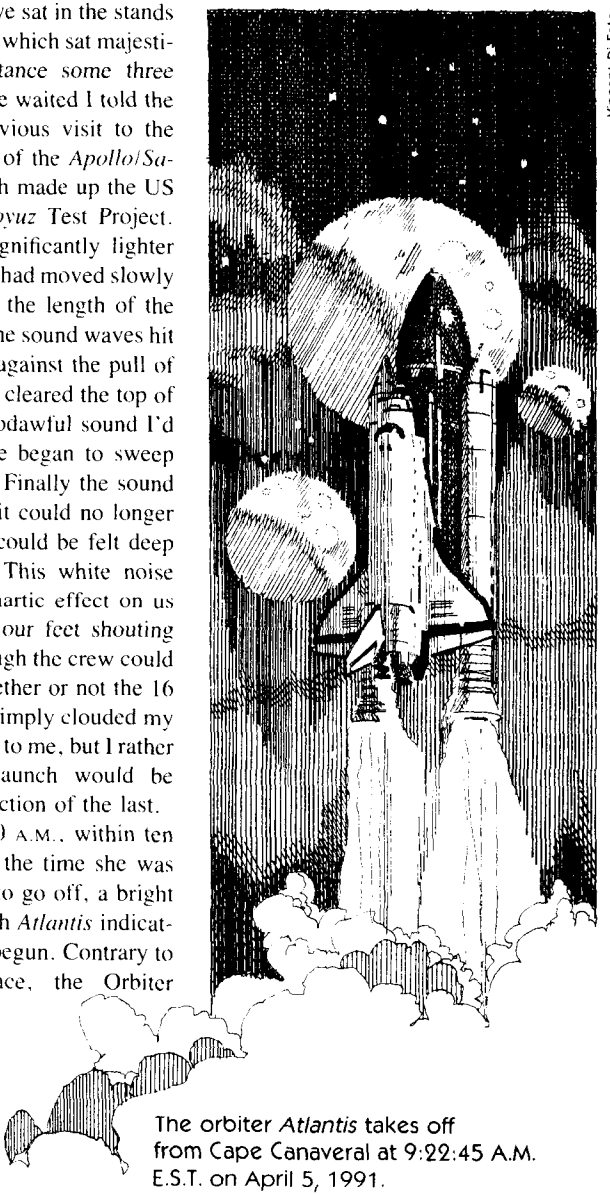
A.M., and for a time we sat in the stands sketching the *Atlantis* which sat majestically off in the distance some three miles away. While we waited I told the others about my previous visit to the Cape and the lift-off of the *Apollo/Saturn* 1B vehicle which made up the US part of the *Apollo-Soyuz* Test Project. That ship, though significantly lighter than the Moon Ships, had moved slowly and painstakingly up the length of the launch tower before the sound waves hit us, craning mightily against the pull of gravity. Just before it cleared the top of the tower the most godawful sound I'd ever heard in my life began to sweep across the press site. Finally the sound became so loud that it could no longer be heard, but rather could be felt deep inside the rib cage. This white noise produced such a cathartic effect on us that we were all on our feet shouting "go, go, go!" as though the crew could actually hear us. Whether or not the 16 years since then had simply clouded my memory was not clear to me, but I rather expected that this launch would be much like my recollection of the last.

Shortly before 9:30 A.M., within ten or fifteen minutes of the time she was originally scheduled to go off, a bright flash appeared beneath *Atlantis* indicating that ignition had begun. Contrary to my earlier experience, the Orbiter



Vincent Di Fate

The orbiter *Atlantis* takes off from Cape Canaveral at 9:22:45 A.M. E.S.T. on April 5, 1991.

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moved swiftly up into the air and a huge cloud of steam billowed around the pad. Below the ship was a tail of bright, golden-yellow flame as she rose swiftly past the launch tower and soared into a huge cloud overhead. As the sound wave descended on the press site I feared for a brief, terrifying moment that *Atlantis* might be breaking apart behind the cloud which concealed her from view. Relieved at her reappearance, I followed her path upward until she was out of sight. Behind her, hanging miles high in the bright blue of the morning sky, was a titanic column of smoke to mark *Atlantis*'s departure from planet Earth.

We assembled briefly in front of the countdown clock at the foot of the press site at Bob Schulman's request so that he could take a few final pictures of the art team. Although each of us tried, none of us could quite put into words a lucid description of what we'd seen.

We met one last time at Bob's room to say our final good byes at around 8 P.M. At that point there was really nothing any of us could say that would have adequately thanked Bob for allowing us to take part in this extraordinary experience. He'd been more than the perfect host and we'd become more than just a group of cordial strangers sharing our time and space together with polite indifference. We'd become something of a family—perhaps not one whose bond would survive the ages, but certainly one whose time together had been truly special. I was the last to leave the room and as Bob reached out his hand to shake mine he said, simply, "Keep in touch." I don't recall my response, or if I in fact responded at all, but keeping in touch was high on my list of good intentions.

Cocoa Beach, Florida—
April 6, 1991

Due to the glut of air travelers to Florida during spring break, it was impossible for me to get a flight back home until around 6:30 P.M. I spent most of the afternoon sunning on the beach with one of the other artists who was essentially caught in the same circumstances. I arrived back at Stewart Airport around 11:05 P.M., tired and enormously glad to be back home.

Wappingers Falls, New York—
April 7, 1991

Sunday. After awakening late Ro and I took another walk back into Merrywood. The deer were nowhere to be seen, but as I casually surveyed the field I knew that they were somewhere in the adjacent woods. It was reassuring to know that they were there in that still and peaceful place, safe from harm.

Eight P.M. and at my insistence, Ro and I took another walk, this time to look at the stars. The Milky Way sparkled above us like so much diamond dust scattered across black satin. Although I couldn't see her, I knew that somewhere in the cold vacuum above, *Atlantis* silently traversed the vast, dark spaces beyond our world. And even though she wasn't visible, it was reassuring to know that she was there. ■

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INTERFACES

Arlan Andrews

It's easy to tell you'd like to have something. Whether you can use it is another question. . . .

One hundred degrees below zero Fahrenheit, Kane Enterly thought bitterly. *Mere springtime in Antarctica!* As if driven by individual ice demons, the unearthly wind chill stabbed through the insulated layers of his parka, a thousand sharp points of deadly cold. Enterly stood with two other figures, similarly miserable, outside the still steaming, chugging, *whupp*ing helicopter that had delivered them to Contact Site One.

Through the frost that continually threatened to obscure his vision, Enterly could barely make out his colleagues. Wiktor Nedelynin, *Novaya Rossiya* news agency, Antoinette Siu, *Xin Hua* agency—a new Russian and a new Chinese. The latter figure kept stomping, in the ancient manner of combating freezing feet, reminding Enterly of a parody of an impatient child. He hoped the tiny Ms. Siu could handle the bulky cold suit; he himself was having trouble with the weight. Nedelynin, though, was an uncomplaining bear of a man, a former combat reporter toughened by his stint at the cataclysmic Siberian Front.

Kane Enterly knew that his fellow reporters, hidden behind those featureless face masks, shared the same thoughts that had obsessed him, in fact the whole world, this last week:

Why did the aliens choose Antarctica? What do they look like?

And of course, *What do they want?*

As if in answer the dark looming bulk of a massive land cruiser broke the featureless white horizon, its buzzing tracks kicking up rooster-tails of granular snow. Behind the reporters erupted a cacophony of machinery noise: *whirrs, whizzes, whup-whups*, announcing the arrival of more Triad land and air vehicles come to retrieve the landed alien. The Historic Moment. Soon Enterly and the other two reporters would know the answers and relay them to the anxious population of Earth.

Inside that approaching land cruiser were three presidents, representatives of

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the premier political powers of the Earth.

And, perhaps, an alien.

"We might as well have stayed behind here the whole time," Nedelynin complained, "for all we learned, freezing our butts off out there at Contact One." Siu and Enterly nodded agreement over the vodka drinks. *Here* was a small "recreation" lounge at Diomede Station, the underground Antarctic complex operated jointly by their three countries, the Triad Powers.

"Sure," Antoinette Siu commented, "what did we gain by frosting our rears for four hours, only to have the whole First Contact vehicle scooped up by a transport helicopter and flown back here without anyone so much as opening a door and waving at us? They *must* have an alien with them for sure. Why else would they deviate from the published plan?"

Enterly smiled at his friends' complaints. *His* wait in the cold had been worthwhile; already his microdisk was en route to Santiago by a very discreet carrier. Enterly was sure that the unauthorized shots from his hidden microcam showing the humongous black land cruiser would become as famous as the zoom shot of that Arab riding a camel on the horizon in that old, old flatfilm. He couldn't remember the name of the film or the actor, but the thought of the all-but-vanished Arabs, those romantic and colorful nomads, made him nostalgic for older days. Looking at his wristcomp in feigned disgust, he said, "An hour more to wait? My nerves won't take another hour, not after all that's happened this week.

"But," he shrugged, "at least it's seventy-two degrees in here, and that's a nice 170 degree increase in temperature, if you ask me." His Russian and Chinese colleagues hesitated a moment, mentally translating the temperatures, then nodded assent. The American refilled all their vodka shot glasses and then drank his own neat, Russian style, one short gulp. Smiling, Nedelynin approved and followed suit.

The world was still in shock after last week's radio messages from the starship *Galactic Trader*, and most of mankind agonized over the potential effects of contact with the newly-announced galactic civilization, but Kane Enterly, veteran TV journalist in these early years of the 21st century, just wondered why he still had a job. Why send a man to the South Pole when a video camera could do the same job?

Getting to the top of the journalistic pile had been relatively easy. *Too* easy, his jealous detractors swore. Enterly's midwestern background had stood him in good stead when the new young president, a fellow Midwesterner, was sworn in just three years ago. Kane had received the cherished White House assignment from WNN, largely because he'd had the good fortune to be interviewing the new president the exact moment the Trade War started. His fantastic luck had gained the young reporter his allotted nine hundred seconds of fame and rapid promotion, because of his brilliant impromptu live coverage from the White House shelters during the accidental and abortive nuclear exchange that had left the Triad Powers in control of the world.

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Enterly frowned at the memory. He'd enjoyed the fame and fortune he'd achieved, but also he had always wanted to go to Germany and Japan and the Middle East. *Maybe in a few more decades*, he told himself sadly, *when they cool down.*

As the time dragged on, the reporters tossed around Enterly's ideas of the devolving role of their profession. "You're right, for sure, Kane. Just cameras in every public place, recording everything without comment, that's what will replace us," Siu agreed remorsefully, the copious amounts of vodka taking their toll. "Most of us are irrelevant to our viewers anyhow, I'm sure."

"Nyet, Antionette," Nedelynin objected. "We reporters must put the spin on the story, tell the viewers what is important, and *why* it is important. Merely showing pictures is too sterile."

Enterly interjected, "Aha! So truth is not enough?"

"*Da*, Kane, my friend. Who is to say that pictures alone are the whole truth? Bare facts must be fleshed out. Skeletons must be clothed!" *Gospodin* Nedelynin's vodka was also taking effect, the American noticed with a smile.

Enterly raised a finger to make a point, but the piezospeaker behind the small bar rattled out, "Press corps! Into the conference hall! Immediately!" The three tipsy representatives of the peoples of their planet scrambled down the narrow hallway to the five-meter-square room optimistically called the "conference hall."

Out of breath, the reporters stood outside the hall door while the security M.P. checked them for weapons. "Jesus, Sarge," Enterly said, "this is the tenth time in the last week you've checked me, and I've never had a gun yet. No place here Down South to get one if I wanted one." The M.P. continued her pat-down, oblivious to the grumbling. Within minutes, the three journalists were seated in the front row in the small conference room, six chairs wide by ten deep. On a foot-high stage, less than six feet in front of them, sat four humans and—an *alien*?

Enterly's jaw dropped. The stranger looked like a tall, well-groomed *Neanderthal*, clothed in a perfectly smooth, totally reflective foil suit, with no visible wrinkles or folds. Over six feet tall and craggily handsome, the visitor did have some peculiarities of chest proportion and arm movement that Enterly couldn't pin down, but overall there was little sense of *alienness* about him. But for the blackness-unto-purple of the alien's skin—the *man's* skin, he decided—if the man sat still he would pass as human anywhere on the Earth. *And except for that shiny suit*, Enterly mused. *Mr. Shiny, that's the name I'll use for him*. He smiled; Nedelynin was right, the American's own journalistic judgment was already putting an interpretive spin on the most fantastic story of all time. *Personalize the subject*, the Russian had said, *Let the readers* feel *his guts*.

Before any of the overawed reporters could make a sound, the Russian president held up a hand for silence. Grimly he said, "We will let you question our guest, but first let him speak to you."

In a deep and resonant voice, the alien spoke. "Lady and gentlemen," he

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began, "I am a specialist from the crew of *Galactic Trader,* especially trained to communicate with your species."

"Speaker-to-animals?" Enterly muttered under his breath.

"Exactly, Mr. Enterly," the alien replied. "But I am also a native of this world, and I am—energized, shall we say?—when the captain requires my services. I have been here to Earth many, many times before."

Even the four humans on the stage showed surprise at that, but the alien kept speaking. "My name? I have none that you can recognize. On the *Trader,* we have—implants—" he touched his right temple with a large hairy hand, the arm doing its strange kinematics again, "—specialized cell cultures grown by gengineering. All crew have them. You would call it telepathy." At the bitten lips of the frightened humans around him, the alien said, "No, I can't read your minds. You haven't the—*build* for it. But my crew mates are of many and varied species, and our 'telepathy' implants provide a common means of communication among us all."

"Interfaces," Nedelynin said flatly.

The alien visitor smiled and waved his weirdly-moving right arm toward the audience of three. "Now, you have questions?"

All three reporters shouted questions at the same time, but Mr. Shiny chose the largest human first. "What technologies do you bring us, *Gospodin* Shiny?" Nedelynin smiled at Enterly's slack-jawed stare. Enterly felt that Antoinette, too, would have her own Chinese version of "Mr. Shiny;" apparently all reporters—all *free* reporters—had similar logic! "And, what do you want from us?"

"Our technologies are very different from yours, *Gospodin* Nedelynin," the alien answered politely. "For example, your president, here, asked us for the secret of unlimited free power. Of course, nothing in the Universe is free, I think you understand that, else why would we millions of beings work as the crew of *Galactic Trader* for so many thousands of centuries? Certainly not for charity!

"But there is another reason we cannot even trade our power technology. We do not use—*electricity*—" he stumbled over the word as if it were taboo, "—rather, the Galactic Standard of energy distribution is a form of localized SpaceTime manipulation; manipulation of the ultra-threads or something. Don't ask me how it works, I'm a mere salesman. But my personal lifetime power source is right here," he said, patting the shiny energy field that molded itself into that marvelous suit around his body. "It does anything I need it to do, including providing this beautiful 'suit.' I keep the face and hands transparent for you to see me, but the energy field does extend all the way around. Bugs, you know—germs. This keeps them out!"

The alien continued, rather smugly, Enterly thought. "Many of the more primitive worlds, not far advanced from your own, typically use hollow fiber networks of—*nanoforms,* you call them?—tiny constructs that carry individual energy packets with them for the tasks at hand. These undeveloped societies employ localized artifices that utilize this form of energy. What you would call appliances, automobiles, air-

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craft, ships, spacecraft, that sort of device."

"Can we buy these from you, Mr. Shiny?" Siu asked. "And what would you take in return?"

"Ah, Ms. Antoinette Siu, much as we would like to sell you this technology, we cannot. You see, although we do carry a sales line of unique appliances and devices, they all utilize certain of the Galactic Standards of energy distribution. We do not sell the energy generators, nor the distribution system. And without the proper interfaces to these machines, you might well detonate your atmosphere or novate your Sun. No, by law, other dealers must install and operate the planetary power grids. We cannot." He shrugged those broad shoulders in apology. "We trade to you that which you do not have, and receive from you that which our other customers do not have. And that is why we have come back, once again, to Earth. Let me explain. . . ."

"The reporter's job is to tell how a human being—himself—reacts to the facts, be they good facts or bad facts," Nedelynin said afterwards to his colleagues. "This makes the story human, makes the audience believe. In the old unlamented Soviet regime, there were always human faces telling you those lies, spinning tales of Western imperialism.

"No one ever completely believed the 'facts' that *Pravda* printed, but it was harder to believe that a person, an intellectual, would deliberately lie while looking straight at you from the television screen." The Russian looked Enterly directly in the eyes, "But of course, they did lie, and so the propaganda was all the more effective.

"You Americans used to have a computer term for what I am speaking of—*interface*. 'Between faces,' that's what human beings have to have for communication. What one person has experienced, he should be able to convey to others." The Russian threw back another neat shot from an enameled brass shot glass. "*Interfaces*, that's us, friend reporters!"

Siu backed up the Russian's philosophy, trying to speak soberly. "The Tiananmen Massacre, the burning of Hong Kong, the nuking of Shanghai—all these horrors can be reduced to mere figures. But when the human side of the story—" she broke off, her tears testimony to tens of millions of her countrymen killed in those days of the mid-'90s, when the Chinese variation of the communist beast finally pushed the stake through its own heart.

Enterly tried to rescue his friends from their gloom. "In my country we don't have such a litany of sorrows to fall back on, my friends. Just this new one, thanks to our Mr. Shiny in there." He grimaced and drank two more shots, one after the other. "Just how do we tell this one, what 'spin' can we give it, so that our countrymen, our whole world, can accept it?" Enterly briefly thought about retreating to the warm beaches of the Caribbean, with strong rum drinks and enough sex and legal D-drugs to cleanse his mind and his soul. Instead, he stood and embraced his grim companions, and then watched as they made their way out to the large jets that would carry them back to their somber tasks.

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He waved as Antoinette Siu boarded the *Goddess of Liberty*, then trudged over to the waiting United Americas jet. The sky, the snow, everything was white. *Everything is north of here; this is the bottom of the world*, he thought. *And at the bottom of history, too. Believe me*, he muttered to unseen billions in an absent audience, *we are at the very bottom!*

Back in his New Atlanta studio, Kane Enterly shook off the effects of antidepressants and prepped himself for the newscast. He checked the foreign news feeds and smiled; each of his trusty friends had sneaked out their own videos from Contact Site One, spiking his own scoop. He laughed aloud, "The same damned smuggler probably carried all our microdisks!" The welcome relief of the laugh subsided as Enterly picked up his paper script and walked over to the news desk to deliver his message of pain to a waiting world. Grimly, he spoke of the News of the Century. "Ladies, gentlemen, other preferences, through the cooperative efforts of the Triad Press representatives," Enterly began as the image of the land cruiser rolled across the video screen, "the world has seen the impressive Antarctic land cruisers that picked up the alien messenger from its—*his*—small deorbiter at the geographic South Pole just yesterday." Onscreen, the gigantic dark vehicle sped past Contact One site.

"As you know, last week the aliens aboard *Galactic Trader* specifically requested by radio that 'representatives of all peoples' be included among the welcoming committee." Enterly smiled for the camera as his image came back up. "No one knew if that meant politicians or reporters, so we all went, just to make sure." Inwardly, Enterly frowned. Sure, they all were invited; it was better P.R. for the alien traders, and also insurance that no one group of humans could corner the market on barter goods and drive up the prices. For all the good that did!

"And as you also know, because of this morning's inadvertent telecast from Chile, the 'alien' looks quite human." Camera close-up. Enterly intoned, "That's because, ladies, gentlemen, other preferences, this alien *is* human!"

Enterly's memory flashed back to Diomede Station and Nedelynin's words ringing in his ears. "Trust," the Russian had said, "They will trust us more than they trust the picture! *Interfaces*, remember! We got to tell them how this guy *smells*!" Metaphorically, of course, Enterly thought. The alien had no body odor, certainly nothing that could overwhelm the 'freeze-dried wet sock' ambience of the Antarctic station and its always damp crew of misfits.

Enterly brought his mind back to the present as the screen faded from Mr. Shiny back to him. "You see, *Galactic Trader* has visited Earth periodically every few thousand years or so for the last three hundred millennia. Mr. Shiny was actually born of Neanderthal parents, and taken aboard the trading ship long ago in our prehistory. He comes out of hibernation when the trading ship reaches humanoid civilizations." Smiling as reassuringly as he could, he continued, "Apparently the crew was surprised at our physiological changes since their last visit, but Mr. Shiny assured us that he could change his ap-

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pearance if need be."

When he comes back! It was getting harder for Enterly to continue; the bad news had to come soon. He was wishing his two comrades were here; maybe they should have all been on one show together rather than individually in their separate countries. Maybe . . . The blinking red light told Enterly to stop the thinking, get back to the acting. "We were allowed to question Mr. Shiny for about an hour before—before he had to be taken back to his deorbiter." Enterly began to sweat, not just from the hot studio lights. "Ladies, gentlemen, opies, here is an edited video of that interview."

"And yes," Mr. Shiny was saying, "I do enjoy my specialty. At my present rate of awakenings, I will be living millions of years from now. I hope my pleasant homeworld Earth is still here, so that I will still have a job." The alien smiled as the reporters shouted other questions. Two billion Western Hemisphere humans held their collective breath for nearly an hour before, finally, Enterly's image faded back in. He glanced at his wristcomp. Three minutes left in the video; only three minutes to explain to those billions what they would not allow themselves to hear. Enterly and the other reporters and the politicians had agreed to erase the last few seconds of the alien's comments. Some things had to be said human to human. *Wiktor was right*, the American thought. *This part has to be 'between faces.' Interfaced.* He frowned.

"This last segment of Mr. Shiny's video interview should be carefully considered," he said in ironic understatement. The image of the alien's face enlarged to fill the screen.

"Why did we choose Antarctica, you ask. It is simple, fellow humans. Your bottommost continent is the least contaminated by electromagnetic pollution, the standing waves generated by your electric power networks. Most of our crew are representatives of the predominant silicon-based Galactic species, and they communicate by electromagnetic waves, much like your radio or television. Their society, though very alien to humanoids, would nonetheless be considered by you as 'hyper-Victorian.' Public sexual displays are totally taboo.

"Unfortunately, many of these crew beings experience pure sinusoidal electromagnetic waves much as we humanoids do erotic body friction." The alien hesitated. "Your fifty hertz emanations, from the East, they experience as sexual foreplay." Enterly could have sworn the alien actually blushed as he said, "And your sixty hertz emissions, from the West, simulate and stimulate orgasms."

Mr. Shiny was visibly nervous. "Even now, my crew mates are quite anxious because of the slight transmission spillover from my implants to theirs. They are anxious to get on with the trading and then to depart quickly." The tall alien held up his open palms in that most ancient and human of expressions of helplessness.

Enterly faded back into the picture, his expression a plea for understanding. "You see, fellow humans, it is a problem of interface. We can not *interface* with their advanced Galactic civilization. There is nowhere to start. Even to have their master traders come down to Earth, we would have to shut down all

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our electrical generating equipment. Furthermore, even if we could buy their appliances and machines, we couldn't turn them on because we don't have their power sources; and the galactic ships that do sell and install those systems never come to our backwater planet.

"In short, we would have to destroy our entire civilization and begin to build another one, using all their technology and none of our own. On the other hand, Mr. Shiny gave us the barest hints of some 'simple' technologies that *could* offer us immediate benefits, personal devices like rudimentary neural implants for every person on Earth, giving us worldwide telepathy; basic DNA repair nanomechanisms that would repair our cells, cure all our diseases, and extend our lifetimes to thousands of years. When we asked him for samples, though, he said . . . "

On video a sympathetic Mr. Shiny was saying, "No, I am sorry, but we must trade item for item. To give anything away would be as unthinkable as—as infant cannibalism would be for most humans. We would not survive economically in the Galactic trading community were we to do such a thing. You humans must deal as equals, not as beggars." He spread his hands out in a gesture of appeal. *Quite the salesman*, Enterly mused sourly. "But we *will* trade with you for all those technologies, though, and many more. We *are* generous as you can see; already, for free, you have gained enormous knowledge just from our arrival. You know that the Galaxy is full of billions of sentient races, untold numbers of beings of all imaginable sizes, shapes, and groupings. *That's* your free gift. But now, introductions are over and ship's time is valuable. Let the dealing begin." From nowhere appeared a baseball-sized sphere floating in front of the alien. "I have here a nanobiological pharmacopoeia of disease treatments. I offer it in trade for the first million tons of your *gwarkhinin*."

Enterly's visage faded back in over the alien's. "It took us some time to understand just what Mr. Shiny and his crew were trying to buy. I will show you in a moment. Oh yes, our scientists tell me that we can produce what Mr. Shiny wants, by genetic engineering. But unfortunately, because we do not have the *gwarkhinin* on hand, the *Trader* has just now—" he looked closely at his wristcomp, eyes dwelling for several seconds for dramatic effect—" left the Solar System, to make their next trade stop. They will return, since Mr. Shiny let it slip, human to human, that we are the only *gwarkhinin* source in the galaxy." Enterly allowed himself a slight smile. "We will play an important part in Galactic trade in due course."

Interface, comrade! Nedelynin's vodka-slurred farewell words came back to haunt the American, *Always tell the truth, but save the* whole *truth for the right moment!* Enterly gathered the scattered, solemn remnants of his courage and continued. He hoped Antoinette and Wiktor were doing better. "The next time the *Trader* returns, we will have the requisite trade goods—unique in all the worlds—and we will be prepared to deal with them as equals. We will know which of those technologies we can deal for—eternal life and health,

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total realization of our personal potential, super-enhancements to body and mind; unimaginable science. A vision of heaven fulfilled, right here on Earth!''

Tears blurred Enterly's vision, though, and his heart went out to all his fellow humans, who like himself, yearned for the vision. ''But according to Mr. Shiny's cheerful information, for all their fantastic technology, faster than light travel is still not possible, so all ships, the *Trader* included, are limited to slower than light speeds. And Galactic distances are vast beyond comprehension.

''On the one hand—the *good news*—this means,'' he said between painful swallows that choked down moans, ''as the genetic engineers tell me, they will have plenty of time—more than enough time—to retro-breed the few remaining elephants into millions of *gwarkhinin*—wooly mammoths! —by the time the *Trader* returns.''

Enterly closed his eyes, tears finally emerging and wetting his cheeks. He whispered, ''In five thousand years!'' ■

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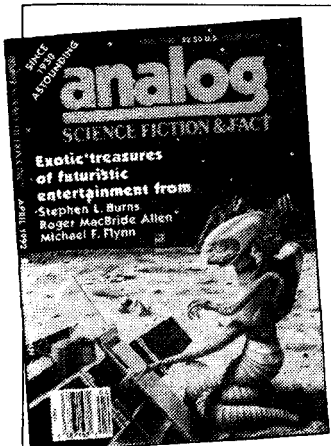

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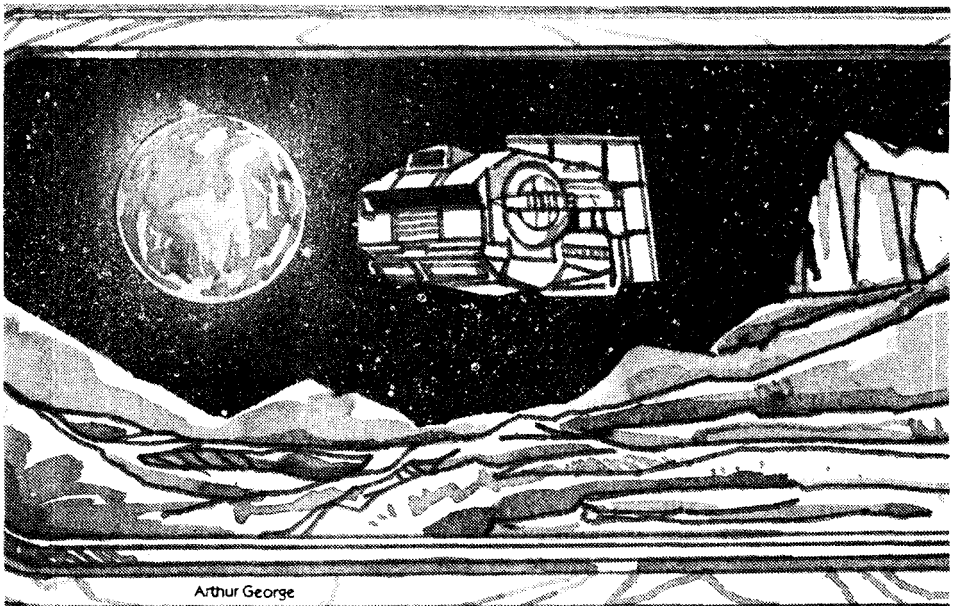

Arthur George

THE CLONE IN THE MOON

Jerry Oltion

The trouble with guinea pigs with minds of their own is that they have minds of their own!

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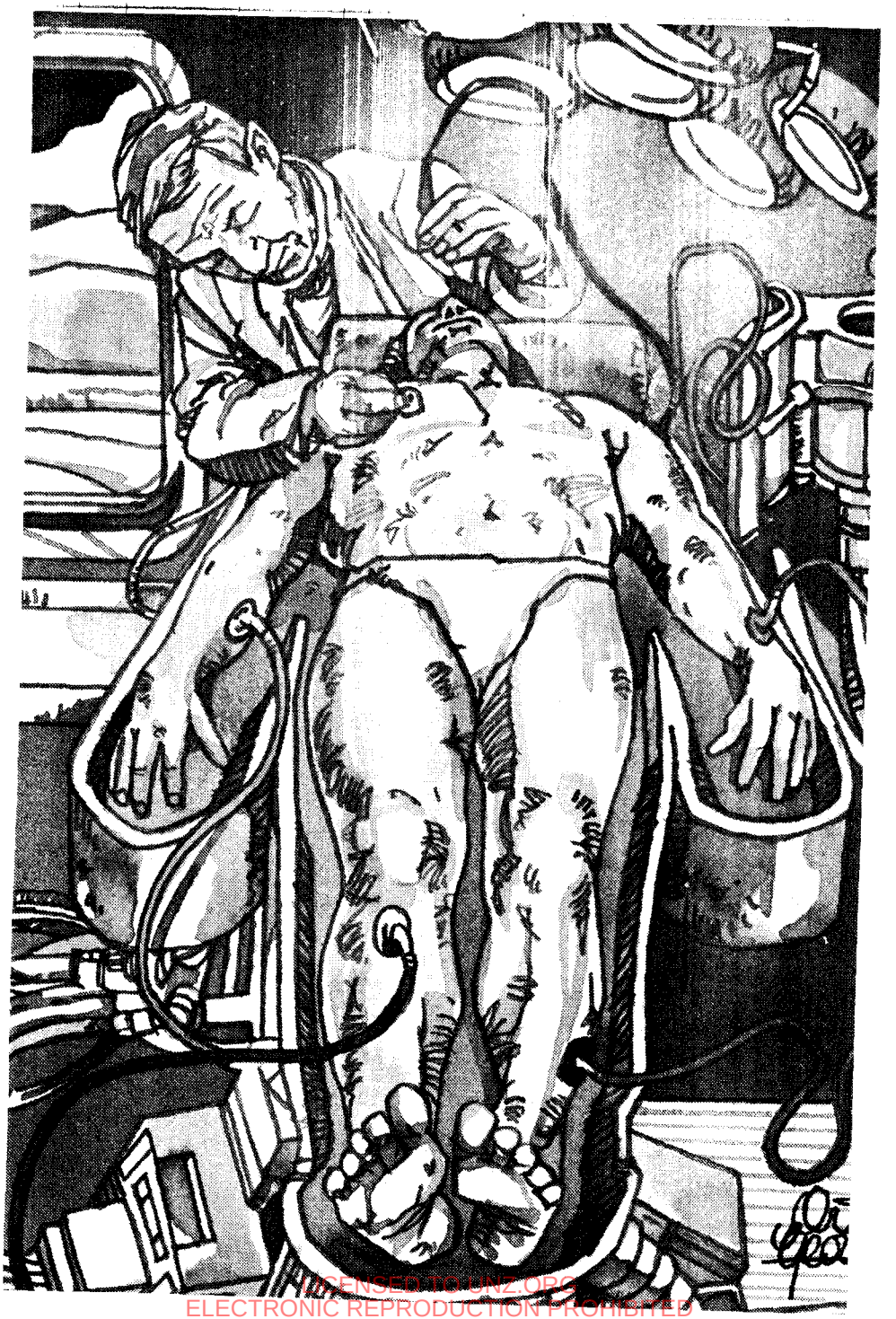

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"OK, now with your other arm."

I relaxed, switched hands, and showed everybody that I could lift five hundred newtons with my left arm, too.

Hans Fielding, head of Copernicus Research Foundation, Inc., puffed on his cigar and looked happy. The smoke hung around him in a veil, drifting slowly upward in the faint lunar gravity. "Very good," he said. "Now let's see you do some leg presses."

I shifted position on the exerciser and strapped myself into the chair. Hans set the resistance at a thousand newtons, which was just about the most that a Loonie in good shape could press, and I pushed it out to full extension a couple of times to show how easy it was. He ran the force up in increments of a hundred until I was pressing two thousand, and I still felt no discomfort.

"Hold it there," he said, and I obediently held my legs extended against the weight of three full grown Earthers—on Earth—while Hans began his lecture.

"First, I want you all to know that Zack has never had any weight training. He's in good health, but he's still well inside the range of physical characteristics we would call average for a Loonie. Yet he's lifting record weight here. He could probably do even more, but his muscle tissue would start to deteriorate under the strain, and his bones probably couldn't take it either." He puffed on his cigar again. "But that's his only limitation. He could hold this much all day. With the enzymes we've introduced into his system, his energy consumption is almost perfectly efficient, with the result that he can work harder on the same amount of fuel, and he never builds up fatigue poisons."

The reporters stood in a semicircle around the weight machine, their forehead-mounted holo cameras winking tiny red activity lights at me. I smiled for them, folded my arms across my chest, and leaned back to hear more about how wonderful I was.

Hans nodded. "In turn, the increased endurance gives him better control. He can manipulate his body under stress as well as you or I can when we're relaxed. He's actually more capable now than if he *had* been doing muscle-building exercise, because he still has his normal mass and normal reflexes. He doesn't feel muscle-bound at all, but he's as strong as anyone on Luna—or on Earth."

Hans took his cigar out of his mouth long enough to permit a smile. "Which brings us to the real reason for all of this. We're going to send him down there and see how he holds up."

"I love the way you put that," I said evenly, flexing my legs once to keep them from locking up.

One of the reporters—I recognized her as Maria Gregov, co-anchor for the LoonieNews channel—turned to me and asked, "How *do* you feel about this, Mr. Alpha?"

I cringed at the name. An eighteen-year-old kid doesn't like to be called "mister," but I didn't much care for the "Alpha" part, either. My full name was Zachariah Alpha, and I had come by it honestly—mine was the twenty-sixth test tube in rack "A"—but I still didn't have to like it. For a moment I felt like telling her what I really thought, but I swallowed my true opinion and gave her the programmed answer.

"I'm proud to be doing my part for

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the people of Luna. If I hold up," this with a crosswise glance at Hans, "this same treatment might make it a lot easier for Loonies to handle going to Earth. The gravity barrier might be knocked down for good."

"How long does it take for the effect to wear off?" someone else asked.

"It doesn't," Hans said proudly. "That's the beauty of it. The enzyme comes from a modified organ, in Zack's case his left lung. The process will work with any organ, but we chose the lung because of the rich blood supply. We cloned it from his own tissue, but before we stimulated growth we modified the parent cell into an enzyme-producer. His new lung works just as well as his original one, but it also produces the metabolic enzymes, which go straight into the bloodstream. He'll go on producing his own enzymes for good now, just like any others in his body."

"You mean he can't return to normal?"

Hans frowned for the first time. "Why would he want to? He can live as normal a life as any of us. All we've done is boost his upper limits; we've done nothing with his basic abilities. He can function perfectly in lunar gravity—he doesn't overreact at all. When he's not using his extra strength it doesn't bother him in the least."

He was telling the truth, so far as we knew it, but something pessimistic in me made me add, silently, *yet*. That was the worst part about the experiments: the constant wondering about side effects. But of course, discovering the side effects was the point of the experiments, wasn't it?

"We've got one more demonstration," Hans said, "to show you how well he can control his muscles under stress. Zack?"

I let the weight down and unstrapped myself, got up, and moved over to the liquid crystal display board. I held my right arm down low while Hans buckled a massive lead weight belt onto my forearm. He handed me a polarizing pen and turned back to beam at the reporters.

"He's got a hundred kilos of mass pulling on him," he said. "That's not all that heavy, but remember inertia. It's about what I mass, so imagine trying to write with me standing on your arm."

Maria Gregov laughed politely at his little self-deprecation, but I knew she saw through his mock humility. With his cigar and the pointed reference to his excess weight, Hans wanted everyone to know that he had enough power to flaunt the public health codes everyone else in the colony had to follow.

I flexed my arm, getting the feel of the mass, then held the pen out to the board, thinking. In the rehearsal I had just signed my name, but somehow I felt the situation called for something a bit more creative. Hans's conceited grin gave me inspiration, so without pausing to consider the fallout, I flicked on the pen and wrote in my smoothest script: *Hans, your fly is open.*

The reporters laughed for real, and I turned my head to smile into the winking lights.

Maria's voice-over teaser on the morning news said, "A revolutionary new enzyme treatment leaves the test subject's sense of humor intact," and the actual segment filled two minutes in the lead slot. I watched the camera cut

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back and forth between Hans and me and decided we both looked like idiots. Maria's commentary was typical newsscreen "gee-whiz," making me feel like a cross between a Tinkertoy construction and something found under a rock. I was strong, I was wonderful, I was the symbol of hope for two hundred thousand gravity-bound Loonies—and by the end of the segment I was harmless. The public saw just what they were supposed to see: another scientific milestone for Lunar research. The Frankenstein monster aspect was played down to nonexistence. It made me feel like going out and tossing a few people around just to wake them up, but in a couple of hours I would be in the transport and headed for Earth, and the Loonies could delude themselves however they liked.

I checked my suitcase again, just in case I'd forgotten something important. It was a long way back if I forgot my toothbrush. But nothing seemed amiss, and I could buy anything I needed on Earth anyway. Hans had given me traveling money.

For something like a second I felt guilty about scuttling his experiment, but it passed. Why should I feel guilty about winning my freedom? Besides, if I succeeded, then the experiment would be a complete success. Living on Earth was what this whole thing was about.

Maybe that was why he was making it so easy for me. I shrugged. I was going, and that was all that mattered. Before the day was out, I'd be out of Hans's clutches forever.

Well, not exactly. Out of his presence, maybe, but his influence reached even to Earth. Hans planned for me to stay with one of his cronies in the Biomedical Research Department at Creighton University. That fit my own plans well enough; I would need some time to get used to Earth before I tried to make it on my own, and this way I wouldn't be spending my own money right away. When I finally did make my break, I'd already know my way around.

I knew it was going to be a shock to my system. I'd spent most of my life in this one room—a four-meter cubicle with a bed, a chair, a desk, and a computer in it. My only window was a virtual pane into a simulated park. I wasn't sure how I'd react to a whole world full of sights and sounds and new experiences, but I was eager to learn.

I spent my last hours pacing like a caged lion, full of nervous energy. Finally Hans came for me about a half hour before the shuttle lifted. On the way to the airlock, just in case he suspected my plans, I asked, "Can I get you anything while I'm there?"

He smiled. "The Nobel prize."

I laughed genuine laughter. We both knew how they felt about genetic engineering on Earth. Part of the reason for this trip, I was sure, was to convince people that there was a positive side to it. But I wasn't likely to be a very good ambassador.

The shuttle waited like a fuming dragon outside the west airlock. I checked my suitcase at the lock, said goodbye to Hans, shook his hand, and managed to get turned around and into the docking vehicle before my eyes began to leak. I was surprised at myself. I hadn't expected to miss Hans at all.

Maybe it was the dome, I thought,

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but whatever the cause, excitement dried me up quick enough. This was my first time outside, and I was all input.

It was standing room only in the docking vehicle, but we only had a hundred-meter crawl over to the shuttle. Once we sealed doors with it, I stepped through to see a roomy cabin four seats wide with an aisle running down the middle. I checked my ticket against the numbers on the luggage rack overhead and discovered that Hans had bought me a window seat.

An older guy in a business suit tucked his briefcase into the rack and sat down beside me. I nodded at him and looked back out the window, fascinated. Outside, the ground crew were running around in skintight pressure suits, disconnecting hoses and cables from underneath and pulling them away. Their suits were transparent body stockings; they wore regular clothing over them to guard from the sunlight. Except for the helmets, it looked as if they weren't wearing anything special at all.

"Fasten your seat belts," a voice, presumably the captain's, said over the intercom. "We launch in three minutes."

"You look glad to be going home," the man next to me said.

I glanced back inside at him. "Actually, I'm leaving," I said. "First time."

"Really?" His eyebrows went up. "Not too many people born here go to Earth."

"Not too many," I agreed.

He held out his hand. "I'm Philip Swain."

"Zachariah Alpha," I said, taking his hand in mine.

I saw his eyes light up with recognition. "You're the guy on this morning's news!"

"Yeah."

He smiled nervously and looked down at his hand. I smiled and kept on shaking it.

"Two minutes," the captain said. I let go and adjusted my belt.

"One minute. Prepare for acceleration."

I realized my mouth was dry.

"Thirty seconds."

I had to sit on my hands to keep from wringing them.

"Ten seconds."

My pulse rate was easily over a hundred.

"Five . . . four . . . three . . . two . . . one . . ."

I got heavy. The ground dropped away below us, and I leaned over to peer out the window. I couldn't see the dome; it was straight below, but I watched the crater rim change from a wall on the horizon to a semicircle beneath us.

"They weren't kidding, were they?"

I turned back to Swain. "What's that?"

"About you. We're under a full one-gravity of thrust right now, and you don't even act like you feel it."

"I've spent some time in the centrifuge," I said with forced nonchalance. Inwardly I was exultant. I was actually in a spaceship! I was going to Earth!

And then the thrust dropped and we were in free fall. I spent half a minute keeping my stomach in line, but it still felt like I'd swallowed an excited cat.

"Breathe deep. Keep your lungs full," Swain said beside me.

I tried it, and slowly the feeling went

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away. "Thanks," I said at last.

Swain looked hard at me. "A loonie who can't handle free fall? That's hard to believe."

"I've never experienced it before," I said.

"Never? But there must be so much opportunity! I'd think a good high leap would do it. Or those motorcycle things you ride around on—joyrockets. You must have ridden a joyrocket before."

I shook my head. "I've never been outside the dome. They don't like their property running around loose."

"Property?"

"I belong to the Copernicus Research Foundation." Swain didn't look convinced, so I said, "It's true. The patent calls me an 'artificially produced self-replicating molecule.' Legally I'm no more alive than the Copernicus dome, which has just about the same number of parts as I do and took even longer to assemble."

At first I didn't recognize the look on his face. Then I got it. "Breathe deep," I said. "Keep your lungs full."

It was a long trip.

Earth was nothing like what I'd expected. The air tasted strange, and the weather kept trying my patience. Every time I even wanted to leave the building I had to check to see what clothing to wear. And the people—well, Swain's reaction should have warned me.

They still remembered the biological wars at the turn of the century, when altered pathogens had wiped out entire cities; and though I was just as much of a victim of genetic engineering as they were, I was also a symbol for them to vent their moral indignation upon. I was an "abomination in the eyes of God," and it didn't help that I was here to test another atrocity, either. So I had a police escort wherever I went, which wasn't much of anywhere except around campus, and even then I had to dodge a few bricks.

One person who didn't condemn me was Dr. Matthewson. Evidently he wasn't worried about taboos, either moral or political. He treated me just as Hans did; that is, like a fascinating experiment in progress. He had me in for daily examinations and made me lift weights and run on a treadmill while he measured my blood glucose level, which he seemed to think was pretty exciting. I didn't. My muscles were too efficient. I was eating one meal a day—breakfast—and getting fat on that despite all the exercise. I was afraid I might have to stop eating altogether, but Matthewson was positively jubilant; he kept rubbing his hands in delight whenever I was around. I didn't like his attitude, but unless I wanted to cut and run before I learned my way around, I was going to have to put up with it.

With all the commotion over my arrival I couldn't very well take any classes, so I had to learn about Earth by watching the cube. What I saw there filled me with a growing sense of alarm. Open warfare in South America, border confrontations between Chinese and American colonies in the Middle East, riots in Australia and Antarctica, and everywhere talk of food and housing shortages. Only seventy years after the biowar, and Earth was already overpopulated again.

I kept an eye on the lunar news, too, though that was scarce and what there

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was of it was mostly edited for propaganda value. I couldn't believe the slant on the story about the Mars colony expedition, which was scheduled to launch from Tycho in another eight months. You'd think with the crowding and the wars on Earth, people would be glad to have the human race get a toehold on another planet, but not so. All I heard was constant wailing about the cost, and lots of blather about how many hungry mouths that money could feed. I could probably eat money, but I doubted many others could metabolize it, and I couldn't imagine Luna giving it to Earth anyway. Nobody stopped to think that the problem was not money but the carrying capacity of the planet, nor that the colony expedition would probably teach us more about advanced farming techniques than any amount of public welfare programs could. Earth people didn't think that way.

Eventually one of the news services talked Matthewson into allowing an interview. Public outrage over me was dying down, and though I was still a long way from being accepted, Matthewson evidently felt that a little exposure now would do more good than harm.

The interviewer and I talked in the roof garden on the undergrad library building. She was tall for an Earth person, with long, straight blonde hair and a reassuring smile. She set an omnicam down on the table while I pulled out a chair for her, then sat down and said, "Thank you, Mr. . . . Alpha? Is that really your last name?"

I sat across from her and tried to ignore the camera.

"It really is. But call me Zack."

"Call me Cindy, then. I've never met anyone from the Moon before. What's it like there?"

I sat down and said, "Well, I can only tell you about Copernicus, because that's where I grew up, but I imagine the other cities are similar. Physically, anyway; politically each dome is an independent state." I waved out toward the campus below us, at the ancient dormitories on our left, classroom buildings on our right, St. Joseph's hospital across the old grass-covered freeway directly in front of us, and the new-by-comparison Lynch Research Center off to the right of that. "Copernicus looks a lot like the university on top. Our buildings are shorter, but they go down deeper than buildings on Earth, and they're all connected underground. The top looks a lot like this, though. Buildings, trees and flowers, just with a dome over them."

"Don't you get tired of being inside all the time?"

"Not really. I never knew it any other way until I came here. The immigrants have problems, but I never did."

"Boy, I could never take it. I've got to have fresh air."

I refrained from commenting. Copernicus's air is filtered; on Earth you take your chances.

"How about the people there?"

Sane was my immediate impulse, but I said instead, "Very research-oriented. Everybody's working on one project or another."

"Yourself included?"

I shook my head. "I *am* a project, as I'm sure everyone knows."

She nodded. "You're supposed to be the perfect human, right?"

I always blush when people say that.

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I shrugged. "Depends on your definition of perfect. I'm what you get when you edit all the redundancies and deleterious mutations out of the standard human genome."

She pursed her lips, phrasing her next question carefully. "There are lots of rumors flying around about why you're on Earth. How much is true?"

I recalled the news broadcasts of the last few weeks. "Very little of it, I'm afraid. I'm here to test a synthetic enzyme." I told her about how muscles atrophy in low gravity, and about my modified lung and the enzymes it produced to counter the effect. I considered telling her my own personal reason for coming, but I didn't want to rush it. I figured I should wait until after the article came out, try to build some acceptance first, and *then* petition for citizenship.

"So you're stronger than a normal person," she said.

"Not really stronger; just more efficient. It's as if you were pushing yourself to the very limit all the time, without getting tired. All on one meal a day."

"Really?" That caught her attention. She evidently hadn't heard about that.

"Yeah. It's kind of a side effect of the enzymes. You see, to keep me from getting tired they had to make sure I wouldn't build up fatigue poisons. Lactic acid and that sort of thing. That means everything has to be burned completely once it gets into my cells, and that means I get more energy out of what I eat."

"I see."

Without thinking, I added, "It would be a simple solution to your food problem here."

She was a pro. Her expression hardly flickered. She just said, "Oh?" and waited for me to hang myself.

It was my background. On Luna, when you get an idea, you follow it through to its logical conclusion, whether it sounds crazy or not. That's how you test to see if the idea is worth developing. The people you're talking with know you're just thinking aloud, and usually they'll toss in a few ideas of their own before you're through. Brainstorming. Everybody does it.

So I said, "Well, with all the food shortages going on, it seems like cutting food consumption would at least be a step in the right direction. If people ate less, then there'd be more to go around. Of course it would take a while to treat everybody, and you'd probably want to find a way to make it a hereditary trait or you'd have to do the whole job over again with each generation, but it could be done. It would be better than war."

That, I learned, was a matter of opinion. Earth people were used to wars; they liked them. At least they liked them better than the idea of modifying the human race. When the interview came out I was suddenly back in the public eye—as an immoral proponent of sacrilegious propaganda, biowar, and just about anything else distasteful to "humanity."

I was back to dodging bricks again. My idea of petitioning the U.N. for Earth citizenship was effectively dead, at least for awhile. And now, after a couple of months among Earth people, I wasn't sure I wanted it anyway. I'd never seen such a closed-minded bunch of idiots in my life.

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I knew I was being unfair. There were no doubt plenty of rational people here; Dr. Matthewson was one of them. But compared to Luna—well, the immigration laws are pretty strict. You've got to be able to think before they let you in.

There was another aspect to all of this, too. I'd been trying to escape from what I saw as slavery, but what was I if not a slave on Earth? Even if I hadn't needed police protection, even if I'd been a normal citizen, there was still the government. Every citizen looked forward to at least four years in the military, dodging bullets for Big Brother. At least the holes Hans poked in me served a purpose.

I found myself watching the Moon a lot from my bedroom window. It was waxing gibbous, approaching full; midday up there. The solar batteries would be working at full power, charging up the domed cities for the next two-week night, and the surface would be covered with people in pressure suits doing all sorts of activities in the Sun. Mining ores, exploring, building new colonies. I tried to find Copernicus, but I wasn't sure just where it was. Somewhere near the equator, I knew, but there were a lot of craters up there.

It didn't matter. The whole ball of rock was home, and it was the most beautiful thing I had ever seen. I wanted to go back.

That was not to be. Dr. Matthewson had listened to my interview, and he'd come up with a wonderful idea. I didn't think it was so hot, but I wasn't in a position to argue.

Three months later I finally opened the door to my own room, set my suitcase inside, and turned on the light. Everything was just as I had left it. My desk was still covered with book chips, and the bed was still unmade. Both had gathered some dust.

I said goodnight to Hans, closed the door, turned out the light, and collapsed on the bed. I didn't move until morning.

When I got up, I left the light off. I was getting pretty good at showering in the dark. I found the water tap and soap and shampoo by feel, and when I was done I found the towel the same way. After I dried off, I padded back out into the room, pulled a pair of pants and a long-sleeved shirt out of my suitcase, dressed, and only then did I turn on the light. I probably didn't need to be quite so extreme about it, but I didn't want to see myself anyway.

They'd turned my skin almost black. There was a ring around my neck, above which I was the normal dark brown of multi-racial mix, and a similar ring around my wrists, but everywhere else I was black. I'm not a racist, but I didn't want to look at it. I most assuredly didn't want light hitting it, because whenever light touched my new skin there would be a series of chemical reactions and a bunch of glucose would shoot into my bloodstream.

There was indeed a ban on genetic engineering on Earth, but there was evidently no restriction on tattooing, even using synthetic chlorophyll ink. Matthewson had turned me into a leaf. Only I was better than a leaf, because the stuff in my skin had an action spectrum about five times as wide as regular chlorophyll, and was thus, of course, more efficient. He'd been developing it for

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crops in polar climates, but my unfortunate remark to the lady journalist had got him thinking.

"It would never keep a normal body going," he'd told me. "There's not enough surface area for that, and the chemistry is all wrong. But you—you don't need as much food to begin with, and your waste products are all carbon dioxide and water! Except for a few vitamins and occasional amino acids, your body will be able to make everything it needs. You'll have a perfect balance between production and utilization!"

So maybe he'd skipped a decimal point somewhere, or else he forgot that a plant can grow more massive than the soil in the pot, but I started getting fat. I wasn't about to give up breathing, so I quit eating altogether, and only then did I level out. As long as it had light, the stuff in my skin was the only food source I needed. I was OK as long as I kept active, but I had to learn to chew water, and I had to relax in the dark.

I was wearing a turtleneck sweater and reading a book in front of the air conditioner when Hans stepped in to tell me about his latest project. Things had gone back to normal between us after my return—that is, nothing had changed for Hans, while I was having a harder and harder time trying to remember what was so neat about life on the Moon. The grass is always greener and all that.

I'd already "participated" in a couple of experiments since I'd been back: one vaccine that was ready for human testing and a new pain-killing drug that turned out to be hallucinogenic. I'd vetoed experiments after that and Hans had backed off, but now here he was again and I could tell by his expression that he had something else in mind.

"Whatever you're selling, I don't want it," I said as he sat down on the edge of the bed and took a cigar out of his pocket.

"I haven't even told you about it yet," he said.

"You don't have to. I'm learning to anticipate when you want to screw with my chemistry. That's it, isn't it?"

"Well—"

"Hans, they still use guinea pigs and rhesus monkeys on Earth. Did you know that? From what I hear, they work almost as well as clones."

"Don't get sarcastic." Hans reached for his lighter.

"Don't light that in here," I said.

He paused, wondering if he should accede to my demand. I'd never asked him not to before. "Why not?" he finally asked.

"Smoke kills house plants," I said.

He snorted impatiently. "Oh, come off it, Zack." He put his lighter away, but continued holding his cigar. "You seem to think we're doing this just for the fun of it, but you're wrong. We're doing legitimate scientific studies here, and the results are helping people all over Luna. We're already using the enzyme treatment for travelers to Earth."

I spread my lips in an idiotic grin. "Gosh, that just makes me glow all over, you know?"

"I said, don't get sarcastic."

"Don't mess with me any more. I'm tired of playing Russian Roulette with a syringe."

Hans got up, walked over to my win-

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dow and switched it on. Bright light streamed in, splashing on the wall beside me. I shifted away from it on the bed. "You're overreacting," Hans said with a shake of his head. "Sunlight won't hurt you, and neither will I. The Foundation spent a lot of money on you; we're not going to give you anything dangerous."

"Of course not. The last experimental drug wasn't dangerous. But you didn't tell me it would send me into orbit without a shuttle, either. Oh, I enjoyed the ride, but I can't help wondering if the next one won't leave me there, you know?" I pulled up a sleeve to expose my forearm, feeling a phantom tingling that was probably psychosomatic, but might have been sugar hitting my bloodstream already. "A couple of your experiments have already had permanent effects."

"The pigment wasn't my idea."

"No, but you OK'd it."

He stuck his unlit cigar in his mouth and we stared at each other for a couple of minutes, neither of us wanting to say what we were thinking. Hans was about to say that he could make me do whatever he damn well pleased, and that made it exactly the wrong time to say what I had to say. But I had to say it sometime, preferably before he laid down house arrest.

He took the cigar out of his mouth. "Zack, I—"

"I want to go to Mars."

"What?"

"The colony ship is leaving in a month and a half. It's only going to have twenty people on board, because they can't carry food and equipment for more. But they can take me, because I don't need food. Not enough to matter, anyway. And I've got good genes. I'd be a perfect colonist."

"Not with a forty million dollar price tag you wouldn't. Where'd you get that crazy idea?"

I showed him the title screen of my book: Sheldon's *Journal of an Interplanetary Flight*. "I've been reading up on it. Did you know that Sheldon planted bean seeds in pots of Martian soil and they grew?"

"Yes, I know. We did some of the work on the microorganisms that killed them."

"Really? Did you—?"

"Look, that's beside the point. You're not going to Mars. We need you here."

"You've got more clones."

"You're the only one we've brought to maturity. It would take years to grow another, not to mention the expense. And we're not going to throw you away on Mars, anyway."

I got up and began pacing the room. "You're saying you plan to keep me here forever? I'm supposed to spend my whole life in this little room, with an occasional field trip down to surgery or the gene lab? Damn it, Hans, I may be a clone, but I'm a human being too!"

"That's a matter of opinion. Legally, you have the same status as a self-aware computer program."

"Legally, shmegally; what about morally? I'm as human as you are. Maybe more so. At least I don't keep slaves."

"And neither do I!" Hans sat down in my desk chair and put his hands over his eyes. "Christ, we've been through this a million times. Eventually, yes,

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we'll let you do whatever you want. As soon as you're out of school and have a definite direction in mind, not some wild notion of being a colonist. I'd like to see you come to work at the lab—as a researcher—but it's your choice. Until then, though, we're responsible for you, and yes, you have to stay here."

"And let you shoot me up every other week with some experimental drug. No thanks. I think my best chance for survival is to get away, now. Either you let me go or I go on my own, but I'm through being a lab animal. I'm going to Mars."

"There's a few obstacles in your way, I'm afraid, starting with about fifteen hundred kilometers of lunar surface. You forget they're launching from Tycho."

"I can take a shuttle."

"Not unless I buy a ticket for you."

I stopped pacing. He was right; I had a credit account, but the limit was nowhere near the price of a shuttle ticket. That didn't necessarily mean I couldn't make it to Tycho, though. It just meant it wouldn't be easy.

"OK, so I can't buy a ticket. You can't keep me off a joyrocket."

Hans smiled around his unlit cigar. "Have you ever flown a joyrocket? No? Think you can plot a fifteen hundred klick ballistic on your first flight? I don't think so. Lots of people who had experience at it have craters named after them now. I think you're too smart to try."

He was right. So it was going to have to be the shuttle after all. I took a deep breath, nodded, and moved back toward the bed as if I was going to sit back down. On the way past Hans I reached out and picked him up by his upper arms, lofted him in the air, and spun him around. His cigar tumbled across the room, hit the wall, and bounced to the floor.

"What are you doing? Put me down!"

"In a minute, Hans. First I need your credit card." I pinned his arms together behind his back, grasping both his wrists and holding him aloft with my left hand while I searched for his wallet with my right. "Don't kick. Ah, here we go." His wallet was in his hip pocket; I flipped it open and thumbed through for his First Copernicus card, took it out, and put the wallet back in his pocket.

"I'll mail it back from Tycho," I said, setting his feet back on the floor and propelling him toward the bathroom. "Sorry, but you'll have to spend a few hours on the throne until the shuttle's gone."

"Save your apology for when you get back."

"Sure. Want your cigar? Might be a long wait."

"Yeah."

I stooped over and picked it up from the corner, dusted it off, and stuck it in his mouth. I turned on the bathroom light and walked him inside, let him go while I slid the door closed, then kicked in the wall behind the door to block it from opening. For good measure I wedged my book in between the door and the frame. When I was done even I couldn't budge it.

"Snug?" I called.

"Very."

"Well, I'd say I'll be seeing you around, but I don't suppose I will."

"Don't count on it."

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"Just this once, I think I will. 'Bye, Hans."

"See you later, Zack."

A half hour later I was beginning to think he was right. The ticket terminal at the west lock showed a shuttle departure within the hour, which was lucky since there were only three flights to Tycho a week, but when I keyed up a ticket in Hans's name I found myself staring at the line: "Authorization Code?" and a space for a six-digit number. The cursor blinked off and on while I swore.

What would he use? His birthday? I didn't know it. Damn. I'd never heard of anybody coding a credit card. I took a wild guess, punched in the current month and year, and yanked out the card when the terminal buzzed. I hit "cancel," grabbed my book bag full of clothes, and headed for a public library terminal.

Fifteen minutes later, armed with Hans's birthdate, I tried buying a subscription to the *Daily Madman*. The terminal buzzed again.

It took me another fifteen minutes and a lot of cross-references to find his mother's birthday, which bought me a room reservation at the Copernicus Hilton. I shouted, "Eureka!" and took off at a run for the west lock, only to see the docking vehicle crawling back from loading passengers. The ticket terminal showed the next departure in forty-eight hours, and no amount of pleading could make it hold the present flight. I watched the shuttle flare out a few minutes later and head south.

I almost went back then and let Hans out of the bathroom, but I couldn't bear to face his laughter. I decided to wait at least long enough for him to get worried. Besides, this would likely be my last trip out of my room for a good long while. Might as well enjoy it. Might as well live it up, in fact. I looked around, wondering what to do first. There was plenty to choose from this close to the lock; shops, restaurants, bars, and massage parlors all competed for the attention of people returning from work outside.

I chose a bar first. I seldom felt the urge to drink, since I usually had to do it alone in my room and the enzymes in my bloodstream didn't let the effect last long anyway, but now I figured I could use a little something to help me relax.

Half a dozen Earthshines later the whole situation began to take on a lot of humor. Here I was only a hundred meters from freedom, both real and political since Copernicus law ended at the dome, but I couldn't do a thing about it. Hans would most certainly be missed before the next shuttle departure, and my room would be the first place anybody would look. Even drunk, I wasn't about to try a joyrocket all the way to Tycho. And the one ground vehicle that I could probably steal, the shuttle docking vehicle, had a range of maybe ten kilometers, at a top speed of maybe five per hour.

I don't remember when the miners came in. I hadn't been paying much attention to them until I overheard a snatch of their conversation.

A deep voice, belonging to a blond guy with tattoos on both arms, said "I think my suit's air plant is going out. It's starting to smell after a long shift."

His companion, a woman with freck-

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les and curly red hair, said, "Try taking a bath sometime."

"Want to trade suits, smartie?"

She laughed. "I doubt if you'd like the way mine fits." She drank, then asked, "How long since you had it serviced?"

"Oh, a couple of months, I suppose. But it's supposed to be guaranteed for six."

Six months. I would never have dreamed an air recycler could last that long. A crazy idea drifted into my head. Mustering my courage, I got up and took my drink over to their table.

"Hey, you guys got a minute?" I asked.

A few more drinks and much discussion later, I found myself trying on a suit in the miners' supply outlet while my new friends Walt and Julie pointed out what was what.

They probably saved my life. I had no idea how closely you had to fit a skintight suit, nor that I would need a zip-on radiation/heat shield, nor any of a hundred other details that the well-dressed miner knows. Walt took me aside and explained the plumbing to me, and Julie warned me to make *sure* my hair net was on tight before I sealed up, and between them they got me dressed for space.

Uh huh. The suit could have been painted on, it conformed to my body so well, and the radiation shield was nothing but a crinkly layer of metallic plastic over that. It was reflective in the dangerous wavelengths, but transparent in the rest so a person could radiate his body heat away or let sunlight heat him, whichever he needed. I bought a selectively polarizable outer suit to help control that, but I planned on running wide open as much as I could, which left me feeling as good as naked, facing hard vacuum in my underwear.

The suit had a satellite transponder for navigation, but I didn't want to be advertising my position every time I queried for it so I also bought a Nearsighter, a palm-sized camera-looking affair that calculated my position based on Earth's orientation and angle above the horizon.

I spent a panicky moment trying to remember Hans's mom's birthday when it came time to pay for it all, but the number finally surfaced in the swamp of my thoughts and minutes later I trudged out with helmet in hand, emergency inflatable tent on my back, the Nearsighter hanging around my neck. I looked like a tourist. I stopped at a supermarket and bought a large bottle of multivitamins, then in a what-the-hell mood we all went up to Richard's-Under-the-Dome and ordered filet mignon, charged, of course, to Hans.

Most of my drunk had worn off by the time we got to the airlock. I was beginning to see how crazy this was, and Walt and Julie were both trying to talk me out of it, but it was a good plan and I knew it would work. Tycho was about sixteen hundred kilometers away—we'd checked it on a map—and I had eleven days of sunlight left to walk it in. I could easily do a hundred and fifty kilometers a day. And there was no way the Mars expedition could refuse a person who could walk a sixth of the way around the Moon to join up.

Julie kissed me for good luck when we got to the airlock, which took my

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mind off the walk for a moment, especially when she did it again after I told her it was my first kiss ever. She made me promise to radio her from Tycho, and I made her promise to call the lab and have somebody let Hans out of the bathroom. Walt wished me luck and helped me seal my helmet, and I stepped into the airlock.

I felt the air rush out from around me, but my suit held so tight my ears didn't even pop. I stepped out onto the crawler track. Walt and Julie watched through the dome; I waved and turned away toward the south and started jogging.

The silence of the Moon engulfed me at once; a peaceful, majestic silence that embraced me as tightly as my stolen pressure suit and banished the fear from my mind. I jogged steadily through it toward the crater rim and began to climb.

When I got to the top I stopped and looked behind me. Copernicus dome looked like a tiny soap bubble resting on the crater floor. I thumbed my nose at it, turned, and walked out into the lunar plain. ■

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CASTLES IN THE AIR

Jayge Carr

Secrets are things that someone would rather not tell—and, sometimes, that others would rather not know....

"It isn't fair," Pinto whined for the *n*th time.

Inevitably, in any mess hall, certain cliques became established. Pinto's friends had heard it before—too many times. Four pairs of adolescent eyes rolled upward. Four pairs of adolescent ears tried the physically impossible task of closing.

"It isn't *fair*," he repeated, louder. "Didn't I earn citizenship? Didn't I? It isn't—"

Camel had had enough. "Complain to the captain," she said mildly, unstrapping herself to rise and float out, though she had nowhere near finished eating.

"You've food left," pointed out Lava, sitting next to her. Waste was not just a sin on the wombship; it was burnt-deep unthinkable.

"I know." Camel sighed, sliding the container of food out of its catches on the eating surface, using a foot to anchor herself with the easy skill of one who has lived a large chunk of her life in weightlessness. "I'll have the messies pop it in a keep-temp-pak so I can take it with me." Another, weary sigh. "That way I can save the time it takes to come back here for my next meal." During the frantic busyness of orbiting, duties were carefully allotted: but there were always many more necessary chores than crew to do them.

"Wheel above, Camel," snorted burly Jereboam. "Don't let the warrants hear you say that. They'll have us all doing it before a chip could add two to two, and the only rest I have now is the float to and from the mess hall."

"And we all know why that is, don't we, fems," put in Lava, in a saccharine sweet voice. "Because you aren't using your sleep period for sleeping."

Jereboam flushed under his space-scarred skin.

"Let's see," Lava purred. "How many fluff-brained fems have no-sleep circles because of you, Put-'er-there Jer?"

"You—" Jereboam surged out of his seat, in his mindless fury forgetting the straps that held him in weightless orbiting until they dug into his body. He snarled, and reached down to unfasten them, only to be stopped by a hand on his arm and a high snigger produced by Click, a small thin youth who always seemed to know everything about the

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ship.

"Come on, Jer." Click produced another snigger. "Don't you realize, she's just jealous."

Lava, who was easily the prettiest girl aboard the ship, and knew it, opened her mouth, closed it, and then produced a snigger nastier than Click's. "If he was the only stud on board—"

Camel sighed, shrugged, and kicked off, sailing easily out the open door and into the corridor.

Pinto stuck out his lip. The running feud between Lava and Jer was old. But while it raged, nobody was paying any attention to him. His lip slid further out. The old argument, with minor variations, droned on. Until—

"It's not as if I were wearing a sign," Pinto announced suddenly.

"Wha—" Jereboam and Lava turned at the incongruous interruption.

"It's not as if I were wearing a sign," repeated Pinto ponderously, with all the concentration of a hen laying an ostrich egg.

"Wearing a *sign*," Lava said slowly.

Jereboam frowned, but Click, who loved mischief, grinned. "Camel."

"Wearing a sign," Pinto repeated. "The warrants don't keep eyes on the crews every minute—"

"Or every flight," Click finished, then repeated, "Camel."

"What are you talking about?" Lava demanded impatiently.

"Signs," Pinto explained impatiently. "I mean, they say I can't, but how do they know? Am I wearing a sign or something? Am I labeled?"

"Pariah," inserted Jereboam, with a sneer.

"That. We all are. But not the other—" He spread out his hands. "It's my first world, crew. Only the mudsiders say No. No to *me*." His thumb tapped his chest viciously. "So the officers always pander to the flaming mudsiders, grovel, grovel, whatever you want sweet, kind mudsiders—" He scowled.

"Medicines," Lava voiced what they all knew. "This world has medicines. *Vital* ones."

"I know *that*." Pinto scowled. "But is that any excuse—"

"Ah." Jereboam smiled. The light had finally dawned. "Sign. Not pariah-sign. They have to let some of us down. But the other. Mudsider prejudice. Talent." His mouth twisted down. "What they don't want to admit is, they're jealous. Blind clods. Only now their idiocy hits where it hurts. You want to go down, and the mudsiders say No Talents, so the officers say No Talents. You're a Talent, but it doesn't show, TALENT isn't tattooed all over you, so—you switcheroo. With somebody. But . . . who?"

"Camel," Click repeated patiently.

"Camel's *fe*male," Pinto said scornfully.

"In an acid-suit and goggles and breathing mask, who's going to know?" Click said slyly. "I'm thinking about shape and size and general overall impression." The smile twisted up. "You and Camel—

The four looked at each other.

Camel.

"Do you need help?"

Pinto turned and gasped. It was not that he was unused to nudity. The wombship conserved power every way

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it could, so in orbit, where the 'ship could absorb heat from the Sun, they *absorbed*, and the spillage they couldn't insulate against sent the ambient temperature soaring. Wombshippers wore what was comfortable as the temperatures rose, which meant less and less, or even nothing. So Pinto had seen many naked bodies.

It wasn't even the changes her world had wrought. He had already seen them over and over. The thick skin, coarse on some, on her a pearl-glorious delight. The downlike fluff of lint white, ultra-fine hair, an angel's halo on her head, a gleaming silkiness elsewhere. The long narrow eyes with their translucent third lid that blinked continuously, giving them a liquid soulful stare. The tiny straight nose with its elegantly slim nostrils, filled with the natural downy-hair filter . . . none of that mattered. She was simply the most beautiful, the most exquisite, the most exotic and desirable, the most—*most* woman he'd ever seen.

He fell instantly, deeply, with all the fervor of an adolescent who hasn't tasted anything but infatuation. Only—

This was Cumulus. Where people lived, not on the planetary surface but kilometers above it, a flotilla of floating rafts high in the atmosphere, the "floor" under his feet—

She took a step toward him. "May I help you?" In that step the resilient floor billowed up and down, walls and ceiling flexing, surging. She kept her balance with lifelong ease, but he watched her, *and* the corridor around her, *moving*—

Up and down, in and out—

He had no trouble with her movements as such; he had grown up, intermittently, with the freedom of weightlessness. But also, because of that same weightless experience and its problems, his instincts *demanded* firm, solid backgrounds, surfaces that stayed fixed, stable in relation to each other. Now this constant fluctuation of all his surrounding . . .

"I'm looking for—" he started. She took another step toward him—uppppp and doowwwnnnn, floor, walls, even ceiling pulsating in unsynchronized rhythm to her movements—and he finished, with desperate honesty: "*I'm going to be sick!*"

She frowned. "Do so then." Another step, and she was close enough that the surface under his feet, elastic, buoyant, surged with her movement. He fell to his knees, helpless.

"Sick. Now." He moaned.

She dropped to her own knees, supported his quivering body. "Shall I summon a healer?"

"Sick," he wailed. "Throw up."

"Do so if it will make you feel better." She arched his now almost helpless body, aimed his mouth at the pinkish green "floor."

"Ooooh—ahhhh—" He shook his head, his hand jammed over his mouth under the breathing shield. Lifelong conditioning prevented him "making a mess."

"Oh." Miraculously, she understood his alien (to her) quandary. "Go ahead. The *flela* will absorb it, no harm done. Go—"

It was all he needed. His hand shoved the shield completely aside—

An eternity later he moaned, shuddered, and leaned away from the mess,

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which smelled stomach-churningly enough that if he had had anything left to lose, he would have.

"All through," she said in a chuckle. (Heartless, he thought, but it didn't change the way he felt about her.)

She whistled a short phrase in a clear warbling tone that was as beautiful to his ears as her world-adapted form was to his eyes.

"I'm sorry—" he managed to squeak, his voice high and thin.

"You needn't be." She was matter-of-fact. "We were warned that you space-riders would have problems on our rafts." She caught the heavy material of his acid suit and pinched it, almost teasingly. "No—" As he started to replace the nose-mouth shield. "Wait."

"But I—"

"A few flaps won't hurt—ahhh." She reached up, and he saw a fluttering peach-colored object, a cylindrical body about the size of one of his fingers, held up by gauzy squares moving so rapidly he couldn't—

"Here." She caught the peach whatever by the body, used the soft wings to wipe at his mouth and chin. "Open your mouth."

"But—"

It was all she needed. She swiped inside his mouth, too. "Bite a little, suck, and then spit," she ordered. "You don't want to keep that vile taste one flap longer than needs be."

He wouldn't have—Wheel alone knew what kind of antagonistic chemicals the thing was carrying!—but even his saliva on it was releasing a cleanser that cut through the awfulness. He bit gently, and more of the relief came. A little cautious sucking, and his mouth began to taste of crisp cleanliness instead of bile.

"Spit whenever you feel like it," she said, on a kindly maternal tone. "Not that the *veeram* could possibly harm you, but you don't want to put back in your stomach any of what came out of it."

"No." He shuddered again, taking the—what had she called it?—out of his mouth and spitting.

"Keep at it until you feel better," his rescuer said, with a smile he mercifully couldn't see. "Shall I whistle another *veeram*?"

"No." Belatedly: "Thank you." Pinto was using the *veeram* enthusiastically now to clean out his mouth. "Wheel above us!" he choked, as he suddenly got a good look at the object he'd been using. *"It's alive."*

"It was alive," she informed calmly. "I broke it before I handed it to you."

If he'd had any more in his stomach to lose, he would have. "You killed it!" he choked, staring at her aghast. His whole society was based on total conservation, that plus the wombshipper's almost religious worship of life sent him into near shock.

"That is its purpose." She took the broken *veeram* from his limp fingers and carefully finished cleaning up his face, before laying the tiny animate carefully on the surface, wings outspread, and positioning his face-shield again over his nose and mouth.

"It is bred for this," she went on with a soft smile, when he didn't say anything. "Its life span is short. When I broke it, I released a chemical from within its body which gave it an onrush

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of pure pleasure. It died almost instantly, but of the overdose of pleasure, not the broken body. It cannot think, or even feel much, but could it do so, do you not imagine it might have chosen the joyous death, easy and clean, to the slower natural one?" She tilted her head. "Your eyes are watering. Are you in pain?"

"No." He swallowed, his voice sounding a little hollow to his own ears with the mask back in place. "Are you sure—you didn't hurt it?"

"Oh, yes." Her smile was gentle—but almost hypnotically attractive. "It felt only pleasure." Her eyes smiled, too, he noticed. "Do you not think it died happy, with a sense of fulfillment, accomplishment?" Simply: "It has completed its cycle."

He gasped. "Look." Finger pointing. "It's sinking."

Slight frown. "I said it had completed its cycle."

"But it's—what's happening?" He looked up at her, absurdly young, a small boy who'd suddenly lost his favorite pet.

Gently, an almost maternal smile. "You sky-riders know so little. It has completed its cycle, and the *flela* is absorbing it, so that its substance can be reused."

He looked puzzled. "You mean the—the *flela* will make more of the—*veerams*?"

"Oh, no." Her laugh was musical. "The cycles are much longer than that. The *flela* absorbs, and digests, and excretes in usable form, that is its completion."

"Oh. Ah." He used her comparative stability to stand up. "Hey." He glanced down. "That—I mean, my—it's sinking too."

"The *flela* absorbs," she said simply. "In a tenth, there will be nothing left." He knew what she meant by a tenth. He had gotten that much from the others, to make up for the briefing he had not had. On a world of eternal dusk, there was little in the way of time frame. A tenth was a tenth of a sleep cycle, roughly fifty stimmets—standard minutes—or a little short of a stour.

"Oh. Urgh." Now that he was on his feet again—she rose gracefully—he was more aware of the slight waves in the material under his feet. The area around where the shuttle landed had been floored with synthi. But once away from there— "Ahhh." He was going uuuppp and downnn again. So was she.

Suddenly—he knew exactly when she got the irresistible impulse, a mischievous grin sparkled all over her face—she bounced. Just slightly. Only the rhythm hit him, and he went—

Up and down.

"Don't do that," he said weakly.

Look of bland, total innocence. "Do what?" She bounced again, harder.

"Fem," he said wearily. "Don't get me in any more trouble than I'm already in. I was supposed to deliver this stuff—" He gestured to the chain of follow-mes behind him, so that from the side he looked like a big-headed caterpillar with a train of disconnected segments. "Only I got lost. I should have been back already—and my shift-boss—" He made the immemorial human gesture, drawing a single finger across his throat.

"My apologies." She became all business. "Who were you supposed to

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deliver them to?"

"Somebody named Irl. At Adjustment Center. Four different people have pointed the way, I feel like I've been going around in circles—"

"You're at the right place. You can deliver to me, now. Come." She gestured, and made an abrupt turn to the left.

"But Irl's male—" If there was one thing this totally feminine female wasn't—

"I'm Millena. Irl's my assistant," she explained, walking away easily with the gliding native stride that was such a contrast to his awkward, tentative steps on the trampolinelike surface.

"Millena," he repeated, following.

"I'll give you a note for your . . . boss, along with the receipt—"

But he wasn't listening with his mind, only his ears. *Millena*, his mind was almost singing it. *Millena, Millena, Millena . . .*

"I won't." Camel was pale under the space scarring.

"You will." Pinto was sure. He faced her boldly, feet firm to the deck in magnesoles, while she floated, hand gripping a hold-strap. His advantage all the way, even to his physical stability versus her precarious drifting.

"It was only to be for the once—" Camel pleaded. "Your first world. Only the once—"

"I have to go back."

Desperate: "No!"

"I'll tell. We'll both get in trouble. It won't bother me, I have enough black marks to coat the sun shields, but *you*—"

It was truth. Camel, even at her young age, was being groomed, was on an officer track.

She gripped the hold-strap so tight he felt his own fingers aching in empathy. "Pinto—please—"

He was implacable. "I have to go."

He won, as they both knew from the beginning he would. But as she watched him go off, clad in her acid-suit and protections, she said bitterly, but softly, so he wouldn't hear: "Whoever she is, I hope she breaks your heart."

Turnabout was fair play.

Pinto cleared his throat.

Millena looked up from the abacus she was working on, its mottled apricot and chocolate rings downy, because they were, like so much else, living animals. "May I help—oh. Hello. How may I help you this waken, Pinto of The Ship."

"I have some free time," he said, gulping. He didn't say that free time planet side was the most precious valuta on the ship, or what he had done and promised to get his short span. "I hoped you might—might show me around." He also hoped that the anti-nauseants that he had stuffed himself with wouldn't wear off too soon.

"Oh. I'm afraid I'm busy." Alien culture or not, she was female enough to recognize when a man—young or not, different or not—was interested in her. With her best smile: "But if you could return later. . . ."

He shrank into himself. "I can't. This was all I could do."

"Oh." She gave him a quick up and down look. He was tall like her people, awkward, thin under the protective suit almost to gauntness. His face, even without the goggles and mask turning it

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insectoid, not attractive by her standards—but few women could have refused the desperate appeal in his young, hurting eyes. "Perhaps I can—" She gave another of those whistles, and within seconds a slim child came running in.

"You wanted me," he said, lisping because one of his front teeth was missing.

"Yes, Irl dear. I'm going to take a short break. Will you finish double-checking the sums of these allotments for me?" (Privately, Pinto thought that Irl ought to be still playing in the nursery, not assisting someone in important work—or worse, doing it alone. But he wasn't going to plug the mouths of his own propulsors.)

Irl glowed. Then, voice bland, face a studied blank except for gleaming eyes: "'Course I can."

"Good boy." Millena stood up, away from the "seat" which was merely a hump in the floor. "I'll be gone about half a tenth—"

Unconsciously, Pinto sighed.

Millena smiled gently. "Well, perhaps a tenth."

Pinto would have said, before, that there would be no sights in a "city" that was in fact an immense flotilla of balloonlike "rafts" floating in the perpetual haze that was the upper atmosphere of Cumulus, that heavy-atmosphere world whose surface would have crushed him instantly, if he didn't fry first.

She proved him wrong.

There were flocks of cloudlings, one of Cumulus's sources of food, flying plant-animals that soared up above the clouds, absorbed energy from the Sun and turned it to living substance. To him they looked like animated jewels, bits of rainbow clarity that fluttered and swarmed, an ever-changing living kaleidoscope.

There was a room filled with pure beauty, samples of arts that he couldn't put a name to, most if not all of it grown, as was so much on Cumulus, the floating city. His gaze went from splendiferous glory to serene elegance, all showing by contrast how bleak his little corridored wombship was.

There were incredible vistas of pure color, hazed by the ever present clouds, but nonetheless pure and soul-soothing.

A tenth wasn't enough, wasn't half enough.

Four shifts later he was back again, at her "office," place of work, or whatever it was.

She wasn't there, but Irl, grinning, his grin showing a tiny pearl of a new tooth in the gap, summoned her.

She frowned, told him he was taking time from both her people and his; but she wasn't proof against the pleading in those wanting young eyes.

For the first free time, he merely beggared himself of all favors owed and potential.

The second cost the equivalent of his immortal soul, in lies and blackmail and conniving.

The rest he simply stole.

Until the inevitable happened.

One of the two inevitables.

He wasn't caught.

Which left her giving in.

* * *

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"What—" Millena sat up in her livvock to stare at her companion. There were many normal reactions for a male under that kind of emotional stress, but crying convulsively, in hoarse, gasping sobs that would have been screams if only he could have sucked in enough air to scream with, wasn't one of them.

"What's the matter—"

He only flinched away from the hand laid gently on his naked shoulder, while the helpless, heart-wrenching sobs continued.

She slung herself out, stared down at the shivering, pitiable lump of humanity. "Pinto—" She shook his shoulder. "Pinto, what's—"

He only rolled away from her, face down, while his body continued to heave and shudder.

"What—" She frowned, put a finger across her lips. She was records keeper. There had been, in the past, attachments between cloud dwellers and wombshippers. But no one hand had mentioned anything like this—

She whistled, and a chartreuse flyer fluttered in.

With easy strength, she rolled the crying youth over on his back, and broke the slim pale green body under his nose. He gasped, choked, and breathed in a pearly green mist. She could see its effect flooding through him, his face calmed—to an ancient sadness.

"What's the matter?" she said, as she had when they first met. "What's the matter, how can I help?"

He sat up, regarding her solemnly, face streaked with tears and slobber, eyes incredibly sad—yet somehow wise. "So that's why you didn't want Talents down here," he said, part accusation, part plaint, part weary acceptance. "You had things to hide."

"Oh—" Her hand came up, covered the suddenly quivering mouth.

Still in that too calm voice. "You—while we were—you were thinking of your husband."

A different tone—almost relief. "Oh! Yanof. He—needn't concern you."

He shook his head, slowly. "This is your world, my lady. If the fact that you don't have a husband does not bother you, it could not bother me. But—" A deep breath. "—do you have a husband? Where is Yanof?" A shudder, his gaze boring into her. "*What* is Yanof —now?"

She fell to her knees, cowering, covering her face with her hands.

Very slowly, he planted his feet on the soft, blood-warm resilience of the floor. "You can tell me now," he said in a calm voice, not a threat, not a promise, merely a statement of fact. "Or you can tell the officers of my ship in a stour or so."

That got to her, as no other threat could have. She looked up at him, her own eyes liquid with sadness. "No."

Still with that unnatural (for him) maturity: "No, you won't tell me, or No, I needn't alert my people of this—" He hesitated. "—this enigma."

Immediate response: "They mustn't know."

"I can't promise that."

"I'll do anything." She grabbed his hand and kissed it. "*Anything*."

He stood up, shaking his head. "They are my people," he said simply. "I must protect them."

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Gritted between her teeth as she rose to face him: "Then tell them nothing."

He looked around for his suit, the goggles and shield.

Her shoulders sagged in defeat. "Please don't make me hurt you any more."

"My people," he repeated simply.

She caught his shoulder. "Believe me," she said with equal simplicity, "the less you know, the better off you are."

He didn't have to say it, it showed in the no-longer-young eyes. *I know too much now.*

Her full lower lip, that he had so recently kissed in uninhibitedly young fashion trembled, then she got it under control. "If I prove to you that what I have said is truth, will you keep your silence?"

"Only if keeping silence harms my people less than speaking." He was firm, the proverbial immovable object.

She swiped at her eyes. "I have spoken truth. But—you will not find it pleasant."

He smiled at her, gently. "Camel would say, if I am hurt it is only what I deserve."

She recognized a truth. "You've grown up."

"If by growing up, you mean learning to recognize and accept my responsibilities—" He frowned. "Camel. I have not—"

"Later," she said with the maternal warmth that was so much a part of her. "Later."

"Later." Again he looked for his shields against the acid in the atmosphere.

"You won't need them. Which is just as well, because if you wore them, we'd never get where we must go."

"All right." Unashamedly naked, he gestured toward the oval opening in the robin's egg blue bubble that was, or so he assumed, her private quarters. "Whatever you say."

"Come then.

"This—" Millena held up a hand. "—is where it starts to get tricky."

He waited. They were in a place that could have been a corridor of his own ship, except that the cross section was oval instead of rectangular. All the walls were smooth and warm and elastically yielding, in swathes of soft colors that hazed from coral to mauve to apricot to ecru.

He had the sudden image of walking down the intestines of some immense beast. And remembered that much of the floating rafts were grown. He put a hand against a curving wall—flesh warm. He blinked, then rubbed at one eye, where the lashes had tangled suddenly, painfully.

"Of course." She snapped her fingers softly, and whistled.

In heartbeats, a couple of flyers appeared, not unlike the one she'd used the first day, only more cantaloupe-colored than peach.

"This will hurt you more than me," she muttered. Before he could ask her to explain that, she hauled back and slapped him, opened-handed across his eyes and cheek.

Instinctively, he stepped back, fists clenched and shaking his head to clear the tears out of his vision.

"Rub the eye I hit. Make it tear more," she ordered calmly.

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"Wha—" His fist dropped.

"Rub your eye. Make it redder. Make it tear." She illustrated by jamming a knuckle toward her own eye.

"Uh—all right." He realized that it had been an attack for a purpose, and ground in on the sore eye, making it tear even more profusely.

"More," she ordered. "Don't hurt yourself, but it has to be all red and swollen and teary."

He shrugged but obeyed.

"All right," she finally said. "Now—" She reached up and plucked one of the flutterers out of the air, broke its spine, and began to apply it to his eye. He could feel whatever it was stinging a little.

"Now." She dropped the dead object, whistled again, this time attracting a couple of lemon-yellow flutterers. Carefully she caught one, broke it, arranged its wings just so, and applied it to his face, using his fingers to hold it in place. A couple of twitches and she nodded, satisfied.

"A mask." He thought he understood.

"That and an excuse for being where only those whose faces are well known should be. Keep that eye screwed shut, as though you were in pain."

"That will be no play acting," he muttered.

"And we'll need—" Again she whistled.

This time the wait was longer. But what came oozing down the corridor were—

Pinto stared out of his half-opened eye. Living rugs. Pelts. Hair . . . *down like the cloud dwellers had . . .*

"Hold still," she ordered and began applying them all over his body. He sneezed, as soft tendrils brushed by his nose.

"Now—" She rearranged the lemon flutterer on his face, twitched the hairy disguise over the rest of him. "Now follow. As though you knew where you were going. The quicker the better."

"*Audaces fortuna juvat,*" he muttered. The wombship had a large library.

She caught his hand and he stumbled along, playing hurt/half-blind for all he was worth. He was vaguely aware of people greeting them, of her cheerful replies.

And that the colors around them slowly deepened in hue, going from soft pastels to richer scarlets, crimsons, mulberries, even rich maroon.

It was like being underwater, he had tapes of underwater worlds to judge from—except that the dominant hue was not greens and blues, but richer blood hues.

"The creatures of the deeps—" He knew she meant the deeper atmosphere, nearer the surface, where the pressures could be a hundred times human normal. "—are almost invariably red hued, dark reds," she informed, dragging him along, "and since we used them for the basis of our living rafts—"

"Oh. Sorry. I didn't mean to say anything. Wasn't criticizing."

"No matter. Keep your eyes down. We're almost there. Stand still a bit." She whistled again.

Behind them was a sort of throaty slurp. He twisted his head and gasped. The corridor had sucked in and closed, forming odd vertical, tightly shut, lips.

"Wha—"

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"This won't take long." He turned again at the sound of her voice, and looked forward.

Gasped again. In front of them, blocking their way, was a similar set of closed lips. They looked remarkably muscular. Firm. Immovable.

With the closing of the lips, the lights seemed to dim. He realized that there were no lights, that they had been seeing by the glow of the corridor walls. Now, in this small space, there was less surface, thus less glow.

Her face seemed bathed in crimson, in the dimness. He could see the tiny hairs on it waving gently.

"Breathe deep," she ordered, and there was a difference in her voice, a hollow note he hadn't heard before.

"Breathe—" He echoed. The air around him seemed almost solid, thick and red and—

Thick.

"Breathe deep. Yawn," she repeated.

"Yawn—" But she was yawning herself, swallowing and working her jaw. He copied her, breathing deep, yawning, swallowing. He could almost taste the air he was breathing: thick, wet, musty, like supplies that had been left a long time in an area too close to the dampness of hydroponics.

"What—" he said—and stopped. His own voice sounded deep, hollow.

Then he understood. Pressure lock. The reverse of what he knew on the ship, a lock to a higher pressure area, instead of lower or vacuum.

He put up a hand and waved it gently, feeling the resistance of the higher pressure atmosphere. "How much, how many atmospheres?" he asked.

She shook her head slowly, her hair trailing with lifelike sinuosity, Medusa from a strange nightmare—or a scene from underwater. "Deep. We haven't your devices to measure in numbers. This is deep. Much deeper than we ordinarily ride. Perhaps halfway to the surface."

Involuntarily he sucked in on the thick atmosphere, choking. That much closer to the hell surface of Cumulus. Halfway down to where the pressure was at least a hundred standard atmospheres. Did that mean they were going to breathe fifty atmospheres?

"The pressure builds up rapidly as you near the surface," she said. "This will be only a fraction of the surface conditions."

He realized that he had not asked it aloud. "I thought I was supposed to be the one with Talent," he said, frowning.

—Did you think that you space-riders were the only ones exposed to sky radiation, the only ones to develop talents—

"Wheel!"

—the bond is forged—(Undertone of a wry smile.)*—I should have realized sooner. Our thoughts have melded again and again—*

—No wonder you didn't want talents coming down—

(A mixture of thoughts, incoherent—unhappy.)

"I'll try to shield up."

"So will I." Her eyes went down. "It's not so common among us, either."

"More and more, though. Like us."

A sigh, her gaze still on her bare, downy feet. "Yes."

He waved his hands again, deter-

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mined to change the subject. "It must be time. This feels thick enough to float in."

"When it's balanced—" With a coughing noise like an asthmatic climbing a steep ramp, the lips opened slowly.

Inside was a scene out of Dante's Inferno.

Dim and red, as though misted with blood.

It was a big deep cavern, big to accommodate the five crimson objects, their flesh bulging like clouds, suspended from the ceiling, swaying slowly in the thick currents.

"What . . . are . . . those!"

"The healings—medicines—you people want, to take to other worlds."

"To save other worlds," he corrected automatically.

"They want," she said coldly, her voice echoing hollowly. "We supply."

He took a step inward, too, realized that the things were huge. Like the holos of some of the undersea creatures of Costeau, or the perhaps mythical wails. Huge and shapeless, featureless, except that the surface coloring was a little darker here, a shade paler there.

Or the fluffy, bouncy cloud structures for which Cumulus had been named.

Except they didn't look cute and fluffy. They looked gross and misshapen, swollen and evil.

"They aren't clouds, they are flesh creatures."

"Well—" Shuddering. "—I hope you haven't been feeding me any of them."

"No." Her voice was oddly choked. "No. Never. We do not eat them. Only—only the medicines. We take the medicines from them."

"I see." He was recovering. "They're distasteful, but every world has its horrors. You mustn't feel—"

Her mind was as closed as her mouth, but something in the way she was standing, some bit of body language, told him: "What—what do I still not understand?"

Then he put it all together. "Ya-nof—they eat—people—you feed them—people—to get medicines—"

Dully: "They are people."

He shook his head, certain the thick atmosphere had made him hear incorrectly.

She repeated it. "They are people." Then, on a sigh: "Were people."

He stared. Blood-hued slugs. Featureless monster-bulks.

"They—" She was having trouble getting it out. "Do you know what symbiosis is?"

He swallowed. Symbiosis: where two dissimilar life forms adapted to living together, producing a new form that could live under situations where neither could alone—and which might be different in many ways from either original.

"How can you do that," he accused, "to anybody, even a criminal?"

"You tell me." She faced him, head high, spine straight. "You tell me. We don't need the medicines this produces, haven't for generations. Many generations. It's your people who do."

He flinched, as though the accusation turned back against him was a physical blow.

"People die," she said, voice slow and sad as a funeral dirge, "without our

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medicines. Your people have said it and we have the Talent, know it for truth. People die, not in ones and twos, but in thousands, tens of thousands. As we died, once, in adapting ourselves to this world, before we discovered that this joining with the *gnarla* had a good effect as well as—" She gestured. "The early ones died, we killed them in pity, in mercy. How many lives could have been saved, had we known then what we know now. Yet how many more will die, if these are the last, and there comes a time when no more medicines go out to our kinsfolk on harsher worlds."

—*How can you*—

"We let them live instead of giving them merciful death. That is our sin." She walked over, touched one of the masses, her hand a pale butterfly against a scarlet petal.

He wondered if that was the one who had once been her husband.

"I don't know." Then, painfully: "They become bonded physically *and* mentally to this world. But because you can no longer touch, mind to mind, because there is no way to communicate physically, does that mean the human mind no longer exists, thinks —knows."

"Please don't tell me any more!"

"You feel you know enough then. Will you tell your people?"

"If I don't—" He put into words. "I share your guilt, for condemning these to a living hell."

"If you do, you share guilt for the ugly deaths of thousands yet unborn."

"They are—obscene," he burst out.

She moved, put her hand on his arm, as though that flesh to flesh contact would convince him of her truth. "We have had a long time to become accustomed to this. Once it was necessary for the survival of our own people. Those stricken, knowing the alternatives, chose to live and save many who would have died."

"All of them."

"No. Enough." Then: "Believe me, were it I, I would choose so."

"You are—braver than I, then." He looked again at the misshapen behemoths. "I would only beg for death."

"As many on other worlds must beg, to put an end to suffering—that could be relieved."

"I think I hate you," he said dully.

"You will be expected back soon. Or they will worry and search for you." Thoughtfully: "There is a third alternative. Accidents happen. You need never go back. We could convince your people of your death—"

He thought it over, then shook his head. "No, that's the same as saying nothing. It's still condemning living people to—" He looked and sighed.

"I but thought to ease—"

"I know." His shoulders sagged. "Thank you anyway."

She held a hand to him. "We should get you back to your people, then."

He followed her meekly. But he knew that she could never take him back, he was no longer the boy who had left.

"Do you think he will tell?" one of the five anxious people in the small blue room asked. Millena had called a council meeting as soon as she had seen Pinto up the ramp to his shuttle.

Millena shrugged.

"You said he was a Talent," the old-

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est councilor said. "How strong?"

"The balance is upset." Millena was firm.

"But only temporarily," a third said. It was a question, not a statement.

"Long enough." Millena said the short phrase like a Solomon pronouncing judgment.

"Oh—Mother!" someone moaned.

"I told him, were the choice mine, I would choose to serve," Millena said softly.

"Oh, my dear—" One of the men reached out a hand toward her.

"It's already started. I can tell. This will be—my last council meeting."

"Millena—" The woman next to her hugged her fiercely.

"I knew the risk when I took him there. I accepted it. I—accept—everything."

"Does he know?" one of the men asked sharply.

"He's Talent. But I think I shielded that."

"Tell him," said the third woman sharply. She was the leader of those who wished to stop the *gnarlas*.

"Then there will be no doubt of his decision, will there?" said the older of the two men.

"He said he knew all he felt he needed to know to make the choice," Millena said. "So—take him at his word. Let him make the choice."

"Share the guilt?" the older man said softly.

"In a sense. We have made the choice by ourselves, for so long. And once we made it for ourselves—" A shrug. "It seemed easy to make it for others, needing, too. Only now—" Saying what they all knew: "They need, but we do not. He is the representative of those who grasp so desperately for what we can provide. Let them share, by proxy then. Let them share."

"Vote, then," the older man said. "All in favor, we tell the 'shipper no more than he already knows. And if he keeps silence, so do we."

Hands went up. He counted them.

"No need to count opposed." Then, no longer the councilor, merely a man: "Millena—"

Pinto lay in his narrow bunkie, staring wide-eyed at the grimy synthi ceiling. Should he tell or shouldn't he—

A parade of images flowed through his mind—

The children of Devo, bellies bulging with malnutrition, heads flopping on scrawny necks, until a treatment that helped them absorb nutrients from what they ate—

The plagues on Bradley, under a sullen dark red sun—

The world now called Third-Time-Does-It, where the wombshippers had twice landed to total death and desolation, burying the corpses of the last survivors, and later, a hundred years, two hundred, unfreezing a new load of volunteers—

Five crimson masses of flesh that had once been human, laughing, loving, crying—

Until he sat up, face serene. "Life is never fair," he said, voice even, calm. He knew what he would choose, what was the only choice he could make and still stay at peace with himself.

And it was his choice.

It always is. ■

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The Alternate View

THE RECESSION: BLAME TECHNOLOGY

G. Harry Stine

One of the factors that has created the current recession is technology.

Technology has had and is having several major roles in the present (early 1992) economic set-back.

Let's try to see what's happening by taking an alternate view.

One of these technology factors is the result of the development of computer technology.

A hundred years ago, our ancestors couldn't count the beans very well. In fact, they couldn't count and keep track of anything very well. The only way a bank knew how much money it had available to loan was to check the hand-kept books. If there was a problem, they had to do an audit—that is, actually go into the vault and count the money. Manufacturers didn't know how much it cost to produce any given product. Shippers didn't know how much they'd shipped from where to whom and for how much, never mind where a shipment was at any given time. Wholesalers, retailers, and warehousers didn't know how much of what product they had in inventory or on the shelves. Records were kept in hard copy generated by bookkeepers.

In fact, armies of clerks were required to process the rapidly increasing data of businesses that were themselves growing very large because they were serving more people. More people were around because the technologies of agriculture and medicine—biotechnologies, both—kept them from starving and dying young. But accounting and other business data processing hadn't changed appreciably since the times of ancient Egypt save for the mass production of paper.

The life of a bookkeeper a hundred years ago seems incredible to us today. For 8 to 12 hours a day, 6 to 7 days a week, he spent all his time seated on a hard stool hunched over a desk. He had to work with papers on which were columns and columns of numbers that he had to add and subtract by hand. A mistake was a serious matter. Women didn't get these jobs. The tasks of a clerk or bookkeeper were physically formidable and strenuous. At the time, businessmen believed only men were suited for this sort of work.

Stress took its toll on clerks and bookkeepers. A news item in the 1890s from Belgrade told of a railway station master who had found a deficit of $1.25 in his accounts. He was so upset that he committed suicide. A posthumous audit revealed that he'd made an error in carrying forward the addition of a column of numbers. Not a penny was missing from his accounts.

Dorr E. Felt's Comptometers and William S. Burroughs' adding machines had just become available. They were mechanical calculating machines. John H. Patterson's cash registers had

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just started to appear in retail stores (over the objections of retail clerks). But it took the pressures of population to break the dam on data processing.

The U.S. Census Bureau had taken almost 8 years to tabulate the results of the 1880 U.S. census. Government and businesses were upset at the delay. They were beginning to find census data to be extremely valuable. Both users wanted more data and they wanted it faster. To do this, the Census Bureau decided to go to a form of mechanical tabulation. A competition was held to select a system. It was won by a young mining engineer, Herman Hollerith, who had been working with the U.S. medical librarian, J. S. Billings, in developing ways to tabulate medical data such as births and mortality. Hollerith came up with a punched card system of storing data. He'd gotten the idea by noticing a railroad conductor punching tickets. But he re-invented the wheel because his Hollerith card—made the same size as the dollar bill of the time—had been invented 90 years before. Punched cards had been used to program the Jacquard looms used to weave the patterns of complex brocades since 1800.

But we can't blame the data processing explosion on Hollerith. Thomas A. Edison, the Wizard of Menlo Park, discovered that information itself was valuable when he invented the stock ticker.

Jump forward in time now to the 1990s. Everyone who wants it has wall-to-wall data, the subject of my previous column. Not only do individuals have very large data banks—some in the form of books, some in their computer memories—but so do other organizations.

Like a new kind of business organization that has arisen because it became possible to collect and organize and access vast amounts of data about *you*. It started with the Census Bureau a hundred years ago, but you were still just a datum in the base. It expanded with the Social Security Act of 1935. This law required that every person who works and makes money in the United States have a Social Security Number (SSN). The people at the Internal Revenue Service caught on to this and began using SSNs as taxpayer identification numbers. The ability to handle large numbers of accounts nationwide prompted oil companies to issue credit cards (that's where I got my first plastic back in 1954). American Express decided to use the money available from its uncashed traveler's checks to bankroll a credit card system. They based it on the successful Diner's Club operation that started in the 1950s. Then the banks, seeing a way to take a percentage off both ends of a sales transaction, became involved with what was originally called "Master Charge" and another universal credit card called "Visa." The credit card industry gave birth to centralized data banks that kept track of the ability of people carrying these credit cards to pay the bills they incurred using these cards.

In the 1980 decade, using the convenience of these credit cards, the American people began overdoing their abilities to pay ("maxing-out" the cards) faster than the United States government, which was dashing pell-mell into deficit spending on its own.

Today, if you don't have a credit

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card, it's tough to cash a check anywhere except at the branch bank where your account exists. The credit card has become a de facto confirmation that you indeed have money in the bank.

In fact, how much "real money" do you carry around with you? The paper money in your possession is only a symbol, a promise to pay on the part of the United States government. Read what's printed on a dollar bill. You may be surprised at what it says. The money in your checking account and in the credit card data base amounts to symbols. *Money is no longer backed by anything.* It doesn't have to be. Our concept of money has changed because of technology.

The credit card phenomenon coupled with the data processing and credit checking capabilities in our society confirms something I pointed out back in the 1970 decade: *Money doesn't have to exist in the real world at all. It can exist in the future as credit. It's symbolic. It's only a way of keeping score.*

Thanks to the technology of data processing.

There are many reasons why we got into the recession and the "credit crunch" of 1991-1992. Technology was one of the reasons. For the first time, we could keep track of money. We had a method of keeping score.

And because we'd never had this before, we had to learn how to use it properly. It's a tough lesson to learn.

But I'm interested in what's likely to happen henceforth. It's the stuff of good science fiction, by the way.

For example, by the end of this recession, most people may have maxed-out their credit cards/lines, defaulted on payments for 120 days or more, or filed for bankruptcy. When these setbacks happen to an individual, it becomes impossible today to reestablish one's credibility. The first step a bank or potential lender (credit vendor) takes is to run a credit check by accessing the credit reporting data banks. According to the existing rules, bad credit reports remain in a person's data base for 3 years. Bad debts or bankruptcies stay there for 7 years. Result: No credit is extended these individuals by credit vendors. This forces a return to a cash economy. In short, if it isn't in the bank or in hand, the money can't be spent. And unless the present rules change (and I think they will), this means a very long recovery!

Why? Our whole financial structure is now built upon the principle of credit! We're counting the beans differently! The beans really don't exist at all!

The situation is typical of a human reaction to a situation that is perceived to be a good deal: *If it's worth doing, it's worth over-doing!* This has one salvation: The Universe lets us know in very certain ways when we've overdone it.

OK, we've overdone it. What's next?

As I've pointed out several times in these columns, we are in a period of great change. This situation is only part of it. We're going to see a totally different form of keeping score come out of this. And we will come out of it because, remember, we're only dealing with symbols. I don't know right now what the new system will be. But I'm thinking about it because whoever figures it out first is going to make a lot of symbols!

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The object lesson? Simple. *Do not underestimate the impact of technology or information on our culture*. Usually, the future doesn't happen the way everyone thinks it will. A "surprise free" future is an oxymoron. A careful look at the credit crunch confirms this. The situation would not have happened at all—or would have happened quite differently—without the development of computer technology or a slightly different track of technology development.

This does not mean we should shuck technological progress and go back to the past. We can never go back without a lot of death and destruction. "Progress"—so maligned by many people—is our way of working out "the mess we're in." Technology, after all, means "know-how."

Yes, new technologies will be developed as we progress out of this situation into the twenty-first century. I think I know some of them. Perhaps more important than the technologies is how we take an alternate view of the situation, treat the problem as an opportunity, and get on with fixing it to make it better. Sure, we'll overdo it again! But that's better than not doing it at all, isn't it?

Remember Herman Kahn's generalized forecast: "A hundred years ago, the human race everywhere was few, poor, and generally at the mercy of the forces of nature. A hundred years hence, barring an incredible combination of bad luck and poor management, the human race everywhere will be many, rich, and largely in control of the forces of nature."

And my own general forecast: "We can do anything we want to do. But we have to be willing to pay for it and to live with all the consequences."

Basically, both are saying, "Be careful what you ask for; you'll get it!"

And please note the qualifiers in both forecasts!

But don't lose hope or heart because of them. The easy and obvious things have all been done already. The difficult or impossible things will automatically become easy once we know how to apply the proper technology to them and have done them. ■

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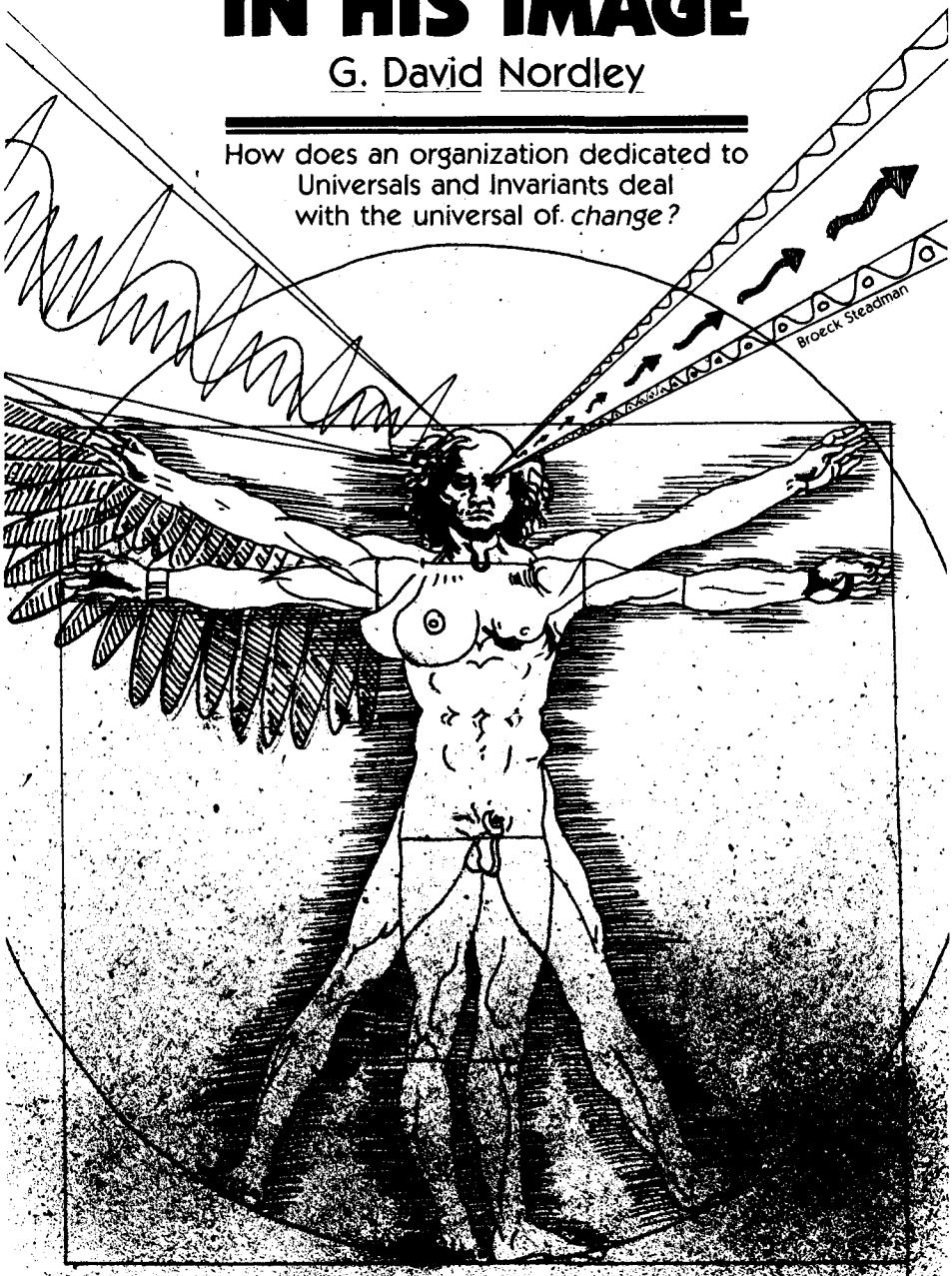
IN HIS IMAGE

G. David Nordley

How does an organization dedicated to Universals and Invariants deal with the universal of *change*?



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Bishop Dimitri Osarian stroked his long beard and looked gravely at the three red numbers displayed on the window of his four-hundredth floor office suite in the Humani Interstellarum Society headquarters in Copernicus Dome.

The first number recorded the genetic difference between the Earth-Human mean and the most divergent of the human colonies from the terrestrial mean. That had been C.J.Station in the Ross 128 belt for the last dozen years. It was 1.42 on the Johnson-Wu scale. On the same scale, the difference between Human and Chimpanzee was ten. Were the Ceejays still human? Did they have souls? "Summon Brother Ignatius," he told his office.

The middle number gave the greatest difference between any pair of colonies. That was up to a chilling 2.4. Would a Ceejay even be fertile with a Mu Cassiopeian? And the last number measured the drift on Earth itself, compared to preserved DNA from 350 years ago. Even that was approaching 0.7. As he watched, the range increased by another tenth. That, he thought, must mean news from an outer colony, years old already, and bad news. The numbers grew with each new report as they had for thirty-six years.

Placing the transparent holoviewer screen to interrupt his view of the nuns in the gardens of the library convent was an act of discipline. Like the flames of St. Junipero's candle, this served to both punish and stimulate himself, should his effort ever slack.

Sister Annette had not been there for many years, anyway. He remembered how she had tried to get him to do something creative, spontaneous, or joyful in his senior music class. Only a few years older than himself, he idolized her. Beauty incarnate, lightness and air. But he couldn't give her what she asked—even then the problem weighed too heavily on him. He had been called, and so he had bitterly suppressed the temptations of his flesh.

Now the numbers told him a story of his failure. For, despite his best efforts at promulgating the most rigorous possible Humani Naturae doctrine for control of genetic engineering, for all his pleas to preserve the species, Homo sapiens was dying.

True, there was nothing grotesque to grab onto, to exploit for propaganda. No third eyes, no deliberate hermaphrodites, or four-breasted women yet. Just a little bit here, a little bit there: an improved memory for Tau Cetians, an end to acne and baldness for Epsilindians, better infrared vision for the Ceejays, life extension for everyone. It just added up. It was like watching the rain forests disappear.

His door hissed and Brother Ignatius interrupted Dimitri's self-indulgent funk.

"I have some good news for a change," he announced, ample form bouncing with his usual bubbling enthusiasm. "They've finally outlawed family shield birthmarks on New Anglia!"

"I thank God for taking the scales from those eyes," he sighed. "But we've a worse problem at Ross 128. They're planning a retrovirus to grow radio transceivers in people's heads so that everyone will be able to hear their station cybermind all the time. They're justifying it as a safety measure!"

"Oh." The jolly Jesuit was quickly

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serious. "More erosion of self-discipline, moral decay. If you can't remember to have your comcomp with you at all times, well, think of what other moral disciplines and observances might slip away!"

"Just so. Monsignor O'Connor is fighting it by pointing out that parents won't be able to hear what sort of music their kids are receiving, and the wags are already saying they hope it means they won't *have* to. But that's not why. God created us in His image, but we're losing the image. We're wiping out His handiwork, not with destruction but with dissipation."

There were tears in Brother Ignatius's eyes, so joyful but seconds ago. "Dinosaurs. If we can't stop it, they'll find they're about as close to their own descendants as dinosaurs are to birds! Your Grace, I think we need the big guns on this."

"I fear you may be right. But after the fiasco on voluntary conception . . . Will they have the nerve to back us?"

That genetic atrocity had become a United Nations law in 2084, over the strident objections of the old church. No woman could become pregnant now unless she actively *wanted* to, and so the moral structure of centuries had collapsed. But the church had been reborn when the birthrate collapsed as well, and Pope Victoria I had convinced many believers that it was their *duty* to procreate. God's law of evolution had then insured that the population would become overwhelmingly of the church, and in sixty years, it had. He remembered the spiritual passion of his youth, and those unclean thoughts about St. Victoria, for which he still did penance.

Even so, HIS was nominally independent, a supplicant to, not an arm of, the church. Dimitri counted a sprinkling of Jews, Sikhs, and even Anglicans among his colleagues. "Vatican 4 convenes next year, and I know the pope is with us. Will that be soon enough?"

"For an encyclical? Perhaps? What is another two years or so when just under a dozen years are needed for them to get the message? It will have to be soon enough . . . though we shall have to pray for the souls who die with abominations while the message is in transit, those who might have been saved if they had known the true word."

"Let me see if I can get it on the agenda."

On time as usual! At ninety-five, Bishop Emeritus Dimitri had to feel his way to the door, leaning on his cane even in lunar gravity. Balance, he thought, not strength, was the issue. His mind was still as sharp and inflexible as ever, and he looked forward to these Wednesday visits of Bishop Ignatius. His loyal old friend would read those hellish red numbers he could no longer see and listen to his advice about a world he no longer knew.

"We've done well, considering," Ignatius observed. "Everything is still under 3.0 except for Ross 128. Of course the data from the furthest colonies is forty years old."

"Peace brother, that cannot be helped. I'm afraid to ask, but have the statisticians agreed on what effect the encyclical, for which we worked so diligently, has had on *those* reprobates?"

"Very little, I'm afraid. Perhaps if

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Victoria III had been more telegenic . . . " The pope's long face, wide mouth, stringy hair, and stubborn refusal to do anything about them hadn't made her a great saleswoman. "But God Himself intervened it would seem. The transceiver task was much more difficult, technically, than they thought." Ignatius chortled. "Electric eel genes did not fit well into human patterns."

Horrors! Dimitri crossed himself. "There were experiments?"

"Computer simulations, Father. They are very good about that, at least at Ross 128. The last paper cited numerous incompatibilities and unintended side effects."

"Oh? But such difficulties are always overcome. The point is that the church continues. God does not act to save us from our own moral failings." He fell silent. The lesson was a hard one for the Churches, Dimitri thought, but one that was finally beginning to sink in.

"Would you guide me on a walk on the grounds?" he asked at last.

"Gladly, Father. Uh, we have much to talk about."

They were quiet during the long descent. They walked slowly through the ground floor and he followed the dark patch he knew to be Bishop Ignatius through the ground level with as much dignity as he could. Dim shadows went by, to be replaced by a green openness, which he felt as much as saw. His dying optic nerves let warmth and brightness through, at least.

The smell of the green grass and open air wondered him like a new thing. How long had it been? Two decades since he had ventured out? He momentarily thought to ask about the world around him. What did people wear now? Who was president and why? But that was unworthy; he had one mission, one purpose, and God was apparently going to keep him alive until it reached an end.

A young woman greeted them as they walked, her voice soft, well rounded, and clear, bringing forth ancient memories of longing, which he had so victoriously resisted.

"Who was that?" he asked.

"Annette Seagull. I thought you knew her. She was once Sister Annette."

"I knew a Sister Annette once. An angel of a woman . . . but she would be over a hundred now." He took a few more painful paces. "Why, I wonder, did this Sister Annette leave the church?" Just then he heard a slow repetitive swish and a light breeze rustled his robes. His world dimmed briefly, and he heard the musical laughter of her voice again, from above. What was that? Oh no!

Ignatius was silent for a long while, then cleared his throat. "Her modification was not compatible with theology, Your Grace, nor, she says, with any reasonable design of brassiere."

"You mean she was . . . and . . . " Had God taken his sight so that he would not see what he had fantasized about so many years? Lead me not into temptation, he recited to himself.

"I'm afraid so. Perhaps the exuberance of flight is incompatible with the discipline of modesty." His friend sighed. "Well, Your Grace, these large physical modifications are often less complex than the intricate biochemical ones, and contribute less to the Johnson-

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Wu score. In her case, the wings were probably budded and not inheritable. Fashions change, lunar gravity is forgiving, we've become used to casual dress on the grounds as well, and . . . oh, there are so many other *worse* problems." He could visualize the cherubic smile and worldly shrug Ignatius could effect at some harmless impropriety, so easy to forgive because of the cleric's basic goodness and loyalty. But this was not harmless.

"Worse? Oh, yes. Ross 128. Where were we? How close have they come? Uh, can you find a bench? I must rest for a while now." Even on the Moon the burdens of life should not be forever, and now, at times he could visualize the light of glory growing at the end of his tunnel.

"The report form C.J.Station says that reception is no problem: the ear itself provides the Fourier transform hardware for signal analysis, to understand a mix of frequencies as speech. It remains only to devise an analog to the inner ear which would be stimulated by radio waves instead of sound. But to transmit . . . Human vocal apparatus is very complex . . . "

"Humph. I'm surprised they didn't simply reverse the process of the auditory circuits, less change that way." What was he saying! He berated himself. Blasphemy! His own mind was becoming inured to the sacrileges being committed against the human form as a matter of course. What will happen to the image of God? Forgive me, he prayed. "Ignatius, the day is coming when we may as soon labor to save the soul of a horse!"

"Or someone who looks like a horse will labor to save *our* souls."

"Ignatius!"

"Sorry." Can there be a naughty twinkle in a voice, Dimitri wondered. "Perhaps a compromise will be found . . . " Ignatius had become practical too, bearing the responsibilities of office. Once, he would have fulminated that *any* deviation was wrong; now, cooked for decades in a brew of statistical figures until soft, his ethics had become relative. Dimitri grunted a grudging assent.

"You needed to talk to me about a local issue?"

"Yes, Father. The standard deviation of our own group is up to 0.18," Ignatius hesitated. "And most of it traces to one individual. Even though his deviation is in the conservative direction, it is still a little unseemly. Without this outlier, our standard deviation would be back to .02, within an order of magnitude of what it was in the old days."

"And what modification might this person be guilty of? I shall pray for him!"

"Not a modification, your grace, but his reluctance to submit to long-blessed medical adjustments. Uh, he refuses the geriatric retrovirus, your grace."

He turned in sightless protest to his friend. So it had come to this, Dimitri thought. Like Job, to fulfill my calling, I must submit to what I detest. Very well, but in compensation, I shall be allowed to view Sister Annette. No, not just view, but abandon everything, grow wings, fly to the top of the dome with her some night, and mate under the stars. There, *that* fantasy should earn him another year in purgatory.

"I will submit," he croaked. "Let us

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return now." He pushed it on the way back. His heart, already pounding, might give God the opportunity to spare him the coming trial.

Former Bishop Emeritus, now Dimitri Cardinal Osarian, slammed his hand on his polished moonrock desk. The abominations! Mu Cassiopeians with *gills!* Had he rejoined the battle only to be mocked and humiliated? He even had to shave his head and bleach his beard to preserve his identity. Vanity or humility? Why couldn't he tell the difference anymore?

He looked out his thousandth-floor window at the pristine vacuum plain. He sighed. At least he was no longer distracted by nuns in a garden, flying or otherwise. The Copernicus crater rim was no longer visible, covered with buildings. Even her holiness was pushing for a modification in the fertility rate, and perhaps a strategic retreat in that direction was called for. But it must be the same for everyone. And at least it wouldn't show.

But some of these other blasphemies! Gradually the bizarre had crept in. Fertile hermaphrodites fifty light-years away, some accursed place in Virgo had aroused the gay orders—the far-off modification had eliminated their cohorts by making it impossible to have an abnormal sexual preference! But the scarlet numbers were still under three and a quarter, under two if you didn't include the old human baseline. And now, in the face of the thirty-year-old news of an alien contact, feelings of human community were popular again. Perhaps, the war could be won, at least in terms of conformity.

Perhaps it had been pride to oppose evolution of the species. But then, why did it feel so right at the time? And why did he feel doubts now that the counterattack was underway?

"Show me the status on Gabriel," he ordered. The red numbers were instantly replaced by graphs of genomes verified and simulations completed. Quietly, at his direction, in the most secret bowels of the building, 180 floors below the surface, a retro-retrovirus was being prepared to reinsert *true* human genes, as defined by the now respectable mean of HIS headquarters. He felt better; the satisfaction of accomplishment.

Dimitri summoned Ignatius. No government would allow this attack, of course. But no government, except perhaps that of the Vatican, would be asked. And, like any modern virus, Gabriel would be carefully programmed to defend itself.

"I think I know where to test our little project," he began when his friend arrived. Ignatius, less rotund now that his metabolism adjusted itself for the lower stress of Lunar gravity, but still brimming with the joy of life and a thirst to combat evil, chuckled. "Might you be thinking of those now-scarcely-human beings at Ceejay?"

The older man grinned. "It's been a while since you've traveled, Brother Ignatius. Though I shall miss you, perhaps a pastoral visit is called for, and if you are carrying a little something else?" Would holes in hands and earlobes grow painfully closed on vain decorations? And those men with false vaginas, filled with nerves and having no reproductive purpose . . . no, the

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thought was too obscene. Forgive me, but those who had grown wings; would they fall from their cylindrical sky as the unholy flesh sloughed from their backs? Yes, Father, I willingly sacrifice Annette to you.

"Ah," Ignatius shrugged, a twinkle in his eye. A friend with whom to share an unworthy thought. He imagined that Ignatius wanted nothing more than to be there as Gabriel took effect. "Do you still have some of that Tharsis brut? It may be my last taste of it in a while."

Dimitri nodded and produced a pair of glasses from the cooler in his great desk.

"I'll save some for when you return. In celebration."

In a life of two centuries, Dimitri thought, twenty-five years goes by in an instant. He was viewing his correspondence-to-answer file, low priority division, and there were several letters he had procrastinated about at least that long. The one he looked at now brought a private smile. The letter was sarcastic, from an Epsilindian monk who did not know his proper role: *of course* no one had done genetic analysis on the consecrated host to see if it was still compatible with the human digestive system! Was he serious? The arrogance!

He longed for news of Ignatius's mission. For nearly a quarter century they had waited and worried: it is a long time to keep a secret. But they were not irresponsible. Nothing would be released without validation on a large, isolated population. The message confirming Ignatius's safe arrival at Ross 128 had reached them just last year. His guarded reports mentioned nothing, of course, of HIS secret agenda, but the normal missionary work had gone well, he wrote. Pictures of Earth humans side by side with Ceejays, and especially the babies, had had an effect. Mechanical wings were back in style there; besides, they performed so much better than the biological ones and, it was said, were less nuisance in bed.

That report had occasioned a visit to his former teacher, who had simply laughed and flitted away to her aerial ballet company. He had to pray to repress his tears.

But this last message, sent just before Ignatius's departure, had been cryptic. He spoke of a potential compromise regarding those obscene genetically engineered radios, something about natural wideband low frequency sensitivity being exploited to reduce the amount of change, but Dimitri didn't follow it. It wouldn't matter if their covert project had worked.

Security demanded that news of the effects of the retro-retrovirus await Ignatius's physical return. The secular governments now popular took a dim view of such church meddling, and only by avoiding all cybernetic networks had they kept the secret. There was little loss in time; in this age of near light-speed beamrider spaceliners, this return was necessarily close on the heels of the last report. Indeed, Ignatius must already be in the Solar System. Now they only awaited word of his landing.

Returning to his mail, Dimitri deadpanned an answer to the Epsilindian monk, citing the superlative 0.003 historical genetic variance they had achieved with the human digestive system. He did not mention that, if Christ

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were to walk into a twenty-third century hospital, He could not give or receive a blood transfusion. Without divine intervention, of course.

He had gotten down to the twenty-three-year-old letters when the door hissed, and Ignatius walked into Dimitri's office, smiling and bubbly, looking little the worse for wear.

"Welcome, welcome," Dimitri chattered, reaching for the sparkling wine he had always kept ready in the cabinet behind him. "I see they didn't make you grow horns! Ha, ha. A little crowded, here, I know, but fertility is down again. It's just that there was a lot of inertia in the form of youngsters ready to have families. Oh things were tense on Earth, but New Saint Peter's should be finished in only a couple of years. They already have the rubble cleared. But what of you? And what of our experiment?"

"I'm afraid it was detected," Ignatius told him, "and I was given quite a lecture. The good news is that there's growing serious concern about what it means to be human, at C.J. Station as well. I had to make some compromises to keep our project quiet, but they agreed. We'll just have to shove it under the rug for a few more years, I'm afraid."

The disappointment hit him like a blow. Then, as he sadly turned back to Ignatius, Dimitri's world came to an end, his hopes shattered, the illusions of a lifetime evaporated like mist. Why not fly with you now, Annette? Nothing else matters, he thought, as he looked with speechless wide-eyed horror at his friend, his protégé. Ignatius continued as if his old friend were unaffected.

"Not you, Ignatius! Oh, why?" he finally cried out.

"But the mission went well," Ignatius insisted. "We got a net reduction in their Johnson-Wu. Would you believe that! A net reduction! What it comes down to is that people still want to look like people. And be people, when it's not inconvenient. The compromise, which *you* suggested in principle, if you remember, was quite successful.

"You see, we already contained, in our auditory system, the latent ability to receive electromagnetic waves. Nerves can act like antennae when exposed to electromagnetic radiation of the right frequency, in fact some cases of tinnitus in which there is no apparent pathology have been explained in this manner. Now, each hair cell in the Organ of Corti is connected to a nerve of unique length. All that was needed was the right transmitter and a mapping function from intended vocal sound to the transmit frequency mix. Isn't that a miracle?"

Dimitri clasped his hands to his head, grimacing in spiritual agony, as if he were trying to squeeze the abomination from it.

"Oh lord," he cried, "first Annette and now Ignatius. How have I failed you? Leave me, Devil, leave me forever." He shouted at Ignatius.

He did not know Ignatius. He *never* knew Ignatius! Ignatius was dead! This . . . this pseudo-Human he had become, except to drink champagne without even pausing in his conversation, had not once moved his lips. ■

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Probability Zero

REAL-TIME

Lee Goodloe

Alex E. Cox spoke quietly into the word processor, made a couple of final clicks with the mouse, scanned the finished page intently, and then saved the file triumphantly. Finished! The culminating paper of the research that he'd started with his dissertation: "On the Translocal Properties of Mg-26 in a Pseudospinel Lattice." He should get tenure for this one. Now to get it submitted.

One last check of the literature, though. No sense in giving the referees an excuse to reject it.

Cox opened a new window on the workstation and called up the real-time literature search. He typed a command, and the keyboard macro squirted the keywords out too fast to follow. (He'd done this keyword search before. Many times.) In a few seconds, the window filled with references, citations to all papers matching his keyword criteria. As he paged through them, the screens refreshed in real-time.

Thank God the fiber-optic interface was so fast. You'd never get anything done with the old 19,200-baud connection, especially with the flood of information nowadays. You'd never keep up otherwise.

Cox had always thought so, anyway. Now he frowned. Several new references were highlighted on the screen,

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papers that had been added to the literature base since he'd last looked at it, yesterday evening. They also seemed like ones he needed to look at.

He sighed, called them up, downloaded the text, and began reading.

A few hours later, the revisions were done. He'd inserted a couple of references, making the obligatory obeisance to "previous work"—the usual academic CYA to keep your colleagues happy. Again a couple of final clicks with the mouse, and then he saved the revised file with some irritation. Finished!

He'd better check the literature again, though. Just in case.

Cox called up the keyword search routine again and scanned the screens.

Then he grimaced. A new paper to look at, just in the last few hours. He downloaded it and scanned it hastily. It *did* seem relevant. . . . Damn! He sat back to read more carefully, mentally fidgeting at having to take the time.

In another couple of hours the revisions were again done. He hoped. But he had to check. . . .

Gingerly, Cox called up the real-time search again, watching the screen with baited breath. Hallelujah! No new keyword matches.

He then quickly called up the network address of *The Journal of Non-Ferrous Ferrites*. He positioned the mouse and clicked.

There! His paper was now submitted. At this point it was up to the journal editor and the referees. But it was a good paper. And he'd done a thorough literature search. He *knew* this was a major career step.

A couple days later, Cox read the reviews—and the editor's letter—unbelievingly. Rejected! "We are sorry that we cannot accept your contribution to *The Journal of Non-Ferrous Ferrites*, but the referees have . . . "

He paged down to the referee's report and started reading. "This work appears to duplicate Smithson's (citation below) in all essential details. Therefore it is not sufficiently original for the *Journal*, and I recommend rejection."

Cox returned to the workstation, called up the literature search, and stared unbelievingly. Sure enough, nestled there among all the new paper titles of the last two days was "Isotopically Doped Pseudospinels, XXXIV: Mg-26," by one J.G. Smithson.

He sat despondently in front of the monitor, unable to do anything but watch. Even as he did so, more new references appeared on the screen, crowding each other out, the screen flickering as it updated in real-time. Finally it blurred into illegibility as the updates happened too quickly to follow. ■

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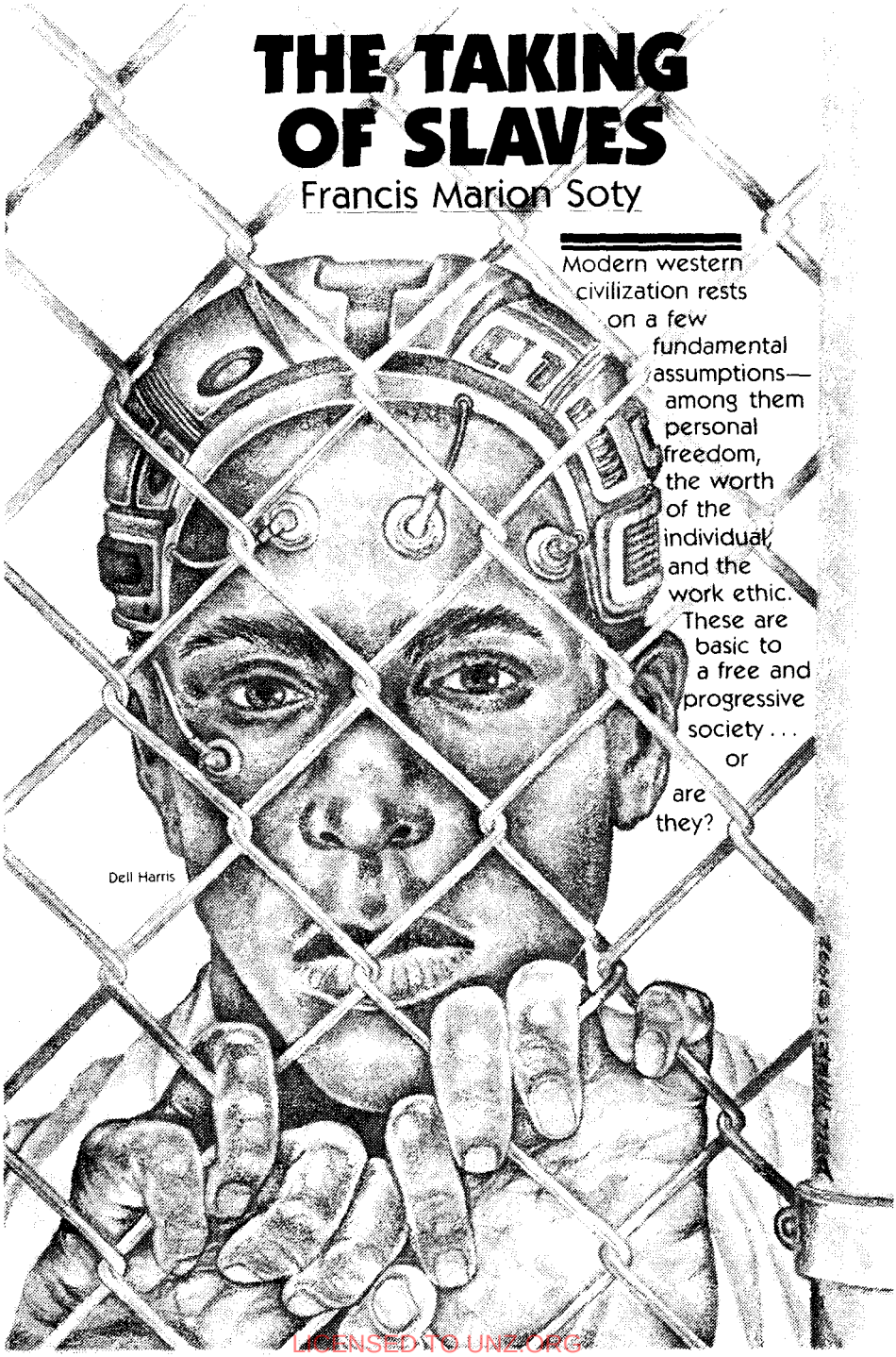
THE TAKING OF SLAVES

Francis Marion Soty

Modern western civilization rests on a few fundamental assumptions—among them personal freedom, the worth of the individual, and the work ethic. These are basic to a free and progressive society . . . or are they?



Dell Harris

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Royce Wantanabe stopped abruptly at the edge of the alpine meadow, breath coming in deep, shuddering gulps, sweat streaming down his face. He wiped his forehead with one ragged shirt sleeve, clearing his vision enough to see ahead. The seventy meters of open, grassy land and occasional rock outcropping were deserted, the infrequent clumps of low brush too small to conceal a slaver. He hesitated only a moment more, until his breathing eased, then plunged ahead, running lightly across the uneven ground toward the shelter of the trees on the opposite side.

The man in the green clothes following his tracks was no hunter—he had lost him earlier at a small mountain stream by grasping a branch and climbing from the water into a tree, a trick every small child knew—but the slaver had some type of machine that let him see recent footprints. He had soon found the trail again, renewing the relentless pursuit.

Only a few minutes ago one of their flying machines had passed overhead. Royce knew they were using similar devices to seek him under the trees. But the forest canopy had been too thick to penetrate, and it had gone ahead without slowing.

This was not the first time Royce had been chased. If he could reach the tiny village only two kilometers away, the elders would come forth with their spears to defend him. That always stopped the child-takers. The green-suited men were cowards, unwilling to confront a group of tall Watusi warriors ready to fight to the death for their children.

As Royce neared the line of trees, a man in a forest-green coverall walked rapidly out of the edge, a little to his left. He was carrying a rifle. Royce whirled to run to his right, but another armed slaver was emerging from that side. He turned more sharply and bounded across the grass at his best speed, dodging and weaving to avoid the expected shot in the back. There was a sharp *crack!* of gunfire behind him, and another to his left. A few seconds later there was a sudden sharp pain in his right buttock, at the same instant the sound of the third shot reached his ears. He yanked out the dart without slowing, fingers checking to see if the two lower ridges had been pushed together, as his parents had taught him. They had, and he felt the first cold touch of the alien fluid in his body as he slowed, seeking a soft spot in which to fall. . . . He found it barely in time.

Royce could no longer move his head, but the first of the two slavers was in his field of vision as he approached. The short, burly black man was speaking into a small dark box on the inside of his right wrist, in Universal English. "Bring in the chopper, Harry. In the meadow, as we planned. Worked like a charm." A moment later the second man arrived, knelt to check his body with several instruments, then laid a cool, wet cloth over his mouth and nostrils. Cotton clouds began to gather before his open, staring eyes, and the last thing he saw was the brown fingers that gently closed them for him.

Royce became conscious of a hand on his forehead. He tried to lift his arms, discovered he could not, and was jolted

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fully awake by fear. He was lying on a bed, both arms and legs firmly held, his head locked in place by a support under and around his neck, with two vertical shafts pressing against the sides of his face. A black woman about the age of his mother, and as tall and slim, was leaning over him. A short, pudgy round-faced brown man wearing rimless glasses, almost bald except for patches of gray hair above his ears, stood watching. He was smiling in a warm, friendly manner.

The woman moved out of his sight. A moment later a thinly padded helmet of some cold metal was fitted over Royce's head, and he suddenly realized he was bald. They had shaved his skull while he slept. The pudgy man made fine adjustments, locking it in place with straps under the chin and below the nose. Royce tried to shake his head, to dislodge the uncomfortable headgear, but the brown man said "Now, now!" and the two shafts tightened against his cheeks.

"Not to worry, my young friend," the man went on. "This won't harm you—though I can't guarantee no headache afterwards. Happens sometimes. Are we ready, Dr. Phillips? All the prelim exams in?"

"Loaded and ready, Dr. Ashamba. The automedtechs say he's a healthy fellow, a fine young man. Some skin parasites I'll work on tomorrow, a broken arm that wasn't set properly and healed a little crooked, a few minor scars. We have the sign-offs to proceed."

"Good, good! Now I believe you know enough U-Eng to understand me already, right, young fellow? This first imprint is a language and vocabulary lesson, so we can talk to each other better, OK? Now you just relax, you're rigid as a stick. I'm Dr. Heriot Ashamba, and I'm your imprinting physician. We're going to become great friends, believe it or not. Hey, you're not relaxing at all. Didn't your warrior elders teach you to save your strength if held helpless by the enemy? There, see, I know a little something about the old Watusi! Now ease up, or I'll have to use a muscle relaxant. Ah, that's better. Brave lad! Now here it comes. Relax and enjoy . . ." and a blinding white light seemed to rise in the back of Royce's eyes and come rushing forward, as if to escape and flood the room with brilliance. Unwillingly, he merged into the light, became one with it, consciousness fading swiftly in the white heat. . . .

When he awoke again Royce was lying on a white bed, dressed in clothes he recognized as pajamas. He lay quietly, trying to get his mental bearings. When he felt certain he was alone, Royce sat up, but had to wait for a slight dizziness to pass before standing. He was in a small room with white walls, with bars on the single window behind him and a metal door. There would be no escaping from here.

It was difficult to think. His mind seemed confused; it was hard to grasp and hold onto specific thoughts. But he knew he must leave. He wanted to return to his family, and the freedom of the cool green slopes of the mountain. He would flee as they took him back to the imprint room for another session . . . and with the understanding

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that he now knew what "imprinting" and "pajamas" meant came a flood of new words, washing over his mind in a tumultuous wave, a cataract of impressions so strong he stood still and shuddered as they passed.

After a few minutes the wave seemed to recede, leaving Royce gasping for breath. It was almost as if he had again been running from the child-takers—another word edged forward into his mind, along with an image of a handsome young black man, by face and body build clearly a Watusi, dressed in forest green. . . *Eco-Ranger n. 1. A member of the United Nations Park Service dedicated to preserving the environment through enforcement of the applicable statutes regarding game and plant preservation . . . (skip) 3. A specialist trained to capture animals alive in the wild* . . . wild animals? He was a *wild animal?*

The strange words and images seemed to retreat to the back of his mind when the featureless door abruptly opened and Dr. Ashamba entered. "Ah, awake. I see. Good, good!" Without knowing he was doing it the plump little man glanced at one of the two cameras mounted near the ceiling. Royce realized someone had been monitoring him, and had called the doctor the minute he stirred. "Just want to do a quick partial physical, verify you're all right. Now please don't fight me, make me call the guards. Waste of my time and your energy. Cooperate like a good boy, OK?"

The doctor had closed the door firmly behind him. The watchful cameras would summon men if he disobeyed or fought. Slowly Royce lay back on the bed and let the imprint physician place various medical instruments on his head and body, chatting in a friendly manner all the while. He seemed almost never to stop talking. Like the chattering women who kept the campfires going at home, waiting for the men to return from the hunt.

"Well, you're in great shape, my young friend. Good thing they caught you, I understand you'd've been eighteen in two weeks, an adult and able to say 'no' to rehab. A miserable life you'd've led on that mountainside, a primitive hunter in the year 2038. What a waste of potential talent in a world where only the back-to-nature freaks and primitives will have kids—unless the government pays mama a small fortune, that is. Well, well, mustn't tell you too much you won't understand yet. Vocabulary's only the first part. Indoctrination starts this afternoon, first full education program on Thursday. About two weeks altogether, and you'll be a new man—quite literally." He paused to chuckle at his own humor. Royce recognized that it was a familiar joke to Dr. Ashamba, one he had used on many earlier patients. "You get to decide what you want to do then, your first career choice, and a little break before you start on your specialty imprints. Well, got five more to check this morning. Busy schedule here lately. See you again this afternoon."

So he was scheduled for another imprint session this afternoon. And it would be an "indoctrination." The first program had only "educated" him. Now the process of actually "changing" him would begin.

And when it was over he would be a

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different person.

Royce discovered he was not really bothered by having this greatly enlarged and more complex vocabulary available. The imprint had taken nothing away. He still knew all that he had learned about hunting, fishing, hut-building, food gathering, and the other skills he had gained on the mountainside. His thinking processes had already been altered, in that he was using new words and their associated concepts with which to frame his thoughts. (And where new and more precise terms conflicted with old ones, he realized, the new dominated.) But he was still Royce Wantanabe in every way. And he still wanted to leave this white prison and return to the free life among his people.

He needed to know more about this place, if an escape attempt was to be successful. Royce decided to wait until at least tomorrow. But he had to get away before the third imprinting session. After that, according to the quiet discussions he had heard among the adults in the village, the "change" was too far along. After that, Royce would no longer be a young Watusi warrior.

Lunch was delivered at midday, with two big and alert unarmed guards waiting in the hall while the door was open. Some of the food was strange to the taste, but Royce ate it all. He could not let himself become weak. He was almost certain this was the UN hospital in Bujumbura, less than two-hundred kilometers from the community on the mountain slopes the first arrivals had named *Asati*, the Hiding-Place. And the doctor had confirmed what his parents had always told him, that once he turned eighteen they could no longer touch him.

When Royce was ten there had been seven children older than himself among the sixteen in the small community, two of them his siblings. Philippe and Michelle Wantanabe had arrived in 2017 with a boy and girl, both of whom had been captured before they reached eighteen. So had the other five. Royce was the first child to be born in Asati. But now there were eighteen more younger than himself.

When they came for him in the afternoon, the same two husky men in white uniforms who had escorted the food server, he offered no resistance. They attached a cuff to each wrist and to themselves; there would be no escaping them.

The two guards led Royce down a long corridor, around two turns, and through a set of swinging fire doors. Enroute they passed many small service rooms opening onto the corridors, and a constant flow of busy people hurrying in and out them. Just before they turned into the imprint room he saw a small reception area ahead, with a guard at a desk close to an outer door. He could see blue sky through a glass in its upper part.

Inside, the two big men were surprisingly gentle as they forced Royce to sit on the special bed and unbuckled the handcuffs. The doctors were a few minutes late, and the guards let him stay free until they arrived. Then Royce had to lie down and be buckled in, including the padded strap across his throat.

"Indoctrination and world history now, Royce, a little lesson on why you're here." Dr. Ashamba nodded at the two guards, who left for their next

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assignment. "The basics of Western Civ and African history, up to 2012, and the trade wars that brought on the second great depression and the steeply falling birth rate. The start of all the little settlements like yours by reactionaries unwilling to live in a world where the imprint cap had become a necessity, and the laws that were passed to at least save the children. Should bring in the adults too, in my opinion, but too many lily-livered liberals say we can't touch anyone with full UN citizenship rights. Includes the right to live like a savage on a mountainside, if that's what you want. The right to be uneducated, poor, covered with skin parasites—like you, my young friend, like you—and subsisting on an unbalanced and unhealthy diet. Wish some of those UN legislators could visit one of your filthy camps! Ready, Inez?"

"Ready," said Dr. Phillips, laying a soothing hand on Royce's chest. And the white light came again, seemingly brighter than before, and he felt himself fading away into its enveloping mental heat. . . .

Royce awoke in his room just before dark, this time with an aching head. He lay quietly for a time, feeling drained and listless. These imprint sessions did no physical harm, as the doctor said, but they were certainly debilitating. Then he sighed, sat up, and forced himself out of bed. He walked briskly back and forth in the small room, still in his pajamas, trying to clear his head. He wanted to examine every inch of the path he had memorized to the imprint room, seeking a weakness, a way of escape. Stray thoughts kept intruding on his effort to concentrate, distracting memories . . . *a birthrate line graph appeared before his eyes as if projected on the white wall . . . a steady but gradual decline until 2012, and then the jagged line dropping abruptly downward* . . . he was handcuffed to two strong men on the way to the imprint room, and returned here unconscious . . . *an incomplete grasp of technically complex subjects even after eight years of study . . . materials learned by imprint are never forgotten* . . . the escape had to be in the imprint room itself then, after the cuffs were removed. If the doctors were late again . . . *education by imprint became available in 2019. World economy improved rapidly* . . . another chart, illustrating the steep drop in crime rates after forcible indoctrination by imprint was approved for repeat offenders in 2027 . . . and somewhere deep within the maze of data Royce lost the ability to distinguish between the imprinted memories and his older ones.

His head was hurting. Royce lay back on the bed and tried to relax. He must escape before the third imprinting. Somehow, he *must*. . . .

Royce was still working on the problem after dinner, when his door abruptly opened and two people entered. In the lead was an attractive young woman in an abstract pattern jumpsuit, with long black hair and artificially reddened lips and cheeks. She was smiling, but there were tears in her eyes. The young man behind her was also casually dressed. It took Royce a moment to recognize his sister Denise and brother Artaud. They had looked very different from the last time he saw either of them. Artaud had

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been gone from Asati for two years, Denise for almost five.

"Oh, Royce!" Denise rushed across the tiny room to where he lay on the bed. She embraced him as he sat up, sitting on the hard mattress with her arms around his shoulders. Denise smelled very clean and pleasant, with just a trace of a perfume he could not identify, and her body felt strong and firm when he returned the embrace.

"We wanted to see you on the first day, but the staff wouldn't allow it," Denise went on. Artaud had seated himself on the foot of the bed and was watching them with a slight smile. "I know you're confused at this point, and you probably hate us for insisting they take you now, but we had to do it. Mama and Papa are never going to come in—they'll die in poverty and misery out there—and we just couldn't see letting you waste your life that way."

Royce tried to keep his face impassive, but his thoughts were churning. Denise and Artaud had insisted he be caught? They wanted him changed, as they themselves had been?

Somehow Royce had failed to guard his expression carefully, and Artaud saw the anger. He stood up. "He isn't going to accept this yet, sis. We'd better go, and come back after a few indoctrinations. Listen, little brother, you don't know what's best for you, and we do. You'll come to understand that soon enough. Now just don't do something stupid, like trying to escape. It can't be done, and you may hurt yourself in the attempt. We'll see you again soon."

Denise gave Royce a final hug, which he did not return, and stood up. "You'll soon see. It *is* for the best," she said as Artaud tapped on the door. It opened immediately, and they left him to his thoughts.

Royce lay back, hands behind his head, and stared at the ceiling, with the cameras watching silently at either end. Between them, they covered the full length of the small room. But even these people could not read his thoughts. The one weakness in their handling of him was in the imprint room, when there was a moment between the time the handcuffs were removed and the straps and collar closed around his body. If he could elude the big hands of the guards, get out into the corridor . . . with luck and speed, he would reach the outer door before the guard there moved. He could jam his own desk against him, then out the door into the open. After that he would have to take the best route out of the hospital area, whatever that might be.

Royce was still planning when he fell asleep, early.

When the handcuffs came off next day in the imprint room and Royce made his dash for freedom, it was almost as though the people of this place had been able to read his thoughts after all. The first of the two husky guards to remove his cuff had stepped back slightly toward the door, and was ready. Royce tried in desperation to run him down, but instead was caught and held, struggling wildly, until the second guard came to assist. Between them they got him back to the bed, just as Dr. Ashamba entered from the inside door.

Abruptly Royce stopped fighting and let them strap him in. A warrior saved

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his strength when resistance was useless. . . . He would fight them in his mind. Somehow, he would resist. When this third indoctrination was over he would still be Royce Wantanabe, he . . . and the white light came.

On his eighteenth birthday the small number of staff he had come to know threw a party for Royce in the afternoon, after his second session. Dr. Ashamba was too busy to attend, but Dr. Inez Phillips came, and Oscar and Mo, the two big escort orderlies in his wing, and three nurses. Royce learned that all except Oscar and Mo had received their education under the cap. When he asked the three nurses why they had not chosen to become doctors, all gave him various personal reasons. The two orderlies, both highly paid professional athletes in their first careers, had declined the opportunity when they retired. They were now financially independent, and did this type of low-paid work to keep busy. About 5 percent of the adult population, for an infinite number of reasons, refused to accept imprinted education. Since all the regular schools had closed, they educated themselves as best they could.

The kitchen had baked a small chocolate cake. The group sat around the table in the rec room and drank coffee and ate slices of it after singing happy birthday. It was a Monday, and Denise was out of town, but Artaud arrived just in time to eat the final bit.

Artaud walked back to the room with Royce. "Are you OK now?" the older brother asked. "You look tired. Selected your major yet? It's very important that you make the right choice. I sometimes think those huge survey courses in the second week aren't enough, that they should allow you a little more time before you have to make a decision."

"I think I know what I want to do. And the final profile shows that I have the aptitude for it. I'm going for architecture. I love to build things; always have. I had a hidden little hut of my own, away from the main village."

"Architecture? Wouldn't have thought it. Well, no one would have picked me as a financial analyst in biomedical technology, either, but that's what I do. And I love it! Denise, now, is a geologist. Specializes in satellite data analysis, but she also has a serious interest in folk dancing. Got her own group organized, and they're relearning some of the ancient Watusi dances. Seems largely a great deal of hopping about, foot-stamping and spear-shaking to me, but some people come to see them."

"I go to the Readjustment Center tomorrow for four weeks, while they wait to see if all the imprints really took. Then I have a series of exams . . . but I suppose you know all that."

Artaud grinned. He clapped Royce on the back as they reached the small room. The door stood open, with the outside locking mechanism turned to "off." "Denise or I will come and get you at least once a week as long you're in Readjust. The worst is over now, Royce. You have a good life waiting."

"I hope so," Royce muttered as he entered the tiny room, and Artaud left. There was now a 3-D set in one corner, but he ignored it and instead picked up one of the four books lying on its top.

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It was *Rags of Glory*, by Stuart Cloete, one of the best fictional accounts ever written of the Boer War. He settled into the compact new reading chair to enjoy the hour or so before dinner in the mess hall. He would be leaving in the morning.

Earlier, when Royce had picked up his first work of fiction and learned how enjoyable reading could be, he had asked Dr. Ashamba at his next session why the book could not simply be imprinted in minutes instead of read over hours. The little man had smiled merrily and said, "Because, my young friend, Sherlock Holmes—or rather his creator, Arthur Conan Doyle—was quite right in one of his speculations, that the capacity of the human mind was finite, and crowding it with junk left too little room for important material. Fiction is something you read, enjoy, and forget. Imprints are permanent, and never forgotten. You have far better access to them than a pre-cap person had to his store of knowledge, but they are with you for life."

Royce liked the Readjustment Center. He had a slightly larger room, and the 3-D was connected to a huge library of both fact and fictional films. There was a small exercise facility available to inmates. He was examined by a physician only twice a week. His days were spent exercising both his physical body and the new-found skills of the mind. Three nights a week he spent with sex therapists, older women from Bujumbura for whom this was a paid voluntary avocation. Most of them had been educated under the cap for their full-time jobs.

After the first two weeks Royce had a brief affair with fellow patient Wilhamina Dubois, a Matabele girl a year younger than himself from the state of Zimbabwe. She had chosen to become an educator, and would eventually be preparing material for the imprint programs that would educate another generation. They were caught on the third night. There was no punishment, but the frosty disapproval of the staff was sufficient discouragement. They agreed to stop, and vowed with passionate intensity to find each other once they were established in the working world. Neither believed it would actually happen.

Denise and Artaud visited Royce or took him away with them once or more a week, as they had promised. Slowly he felt the anger and resentment he had harbored against them easing, until finally it went away entirely and he could relax in their presence. There was no choice but to admit they had been right. If their parents wanted to spend their lives wild and free, that was their business—but it was immoral to impose such a choice on an impressionable child.

At the end of the month Royce returned to the hospital to start his final set of imprints. He had remained firm in his desire to become an architect. It was a long series, and took two months. There was another week of quiet but restless waiting in his room at Readjustment after that, while he was tested and retested to verify the imprints had all taken. Then he left for Stellenbosch in the state of South Africa and a job with the Conservation Corps.

It was standard practice to start with a civil service position after Readjustment, then move on to a better paying

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job in private enterprise after sufficient hands-on experience. But Royce felt comfortable with his work almost from the first time he called up a CAD program and started laying out the basic design for a new animal breeding facility in the Capetown Zoo. He could still recall all he had been taught about plaiting the long tough mountain grasses to form a waterproof roof for his little hidden hut near Asati. This seemed more an enlargement of his capabilities than a major change. He found that he obtained a real sense of satisfaction and accomplishment from his work. It was everything that he had expected.

Royce enjoyed a series of brief and unmemorable affairs with some coworkers, plus other women he met in town, but found all of them eventually unsatisfying. Finally he realized what was bothering him, and set out to locate Wilhamina. He was delighted to learn that she was still unattached, and had often thought about him.

Three months later Royce and Wilhamina were married. Shortly afterward he left his state job for a position with a private firm that had a long-term contract to design housing for the workers in the North Sahara Reclamation Project. Wilhamina worked at home, writing lessons that would become imprint programs for the UN Education Service. She made surprisingly good money, although there were no career-employee benefits.

The aircar dropped Royce off at the slide-center, and he walked the few meters to the north intersection. He was tired after a long day doing computer searches for existing stress analysis programs that could save the firm considerable time on the Zambezi River dam powerhouse. He thought about the first design work he had completed, twenty years ago now, on animal housing. How simple and easy it seemed in comparison.

It was a pleasant evening in the planned community of New Ichorwa, Zimbabwe State. He never tired of easing to the center of the slidewalk and watching the waist-high floral side barriers apparently rushing past at increasing speed. He kept walking, as was his habit; there was never enough time for exercise. They had installed physical fitness equipment in the spare room two years ago, when the youngest finished her final imprint and took a job in North America, but somehow there always seemed to be work around the house that urgently needed his attention.

Royce eased to the side and slowed as familiar landmarks passed, then stepped off on the solid sidewalk leading to his front door. It was out of sight around a tall growth of hibiscus, urgently in need of cutting back. He sighed. If only someone could invent a robot gardner capable of a little judgment . . . the last one had killed several of his oldest plants before he had returned it as insufficiently programmed.

Royce paused when his door came in sight. The house, tucked into the hillside behind it, seemed to blend into the wood-covered slopes, the green-tinted windows in front not that obvious unless you knew where to look. He had designed it himself, though he would readily admit most of the physical structure came from existing CAD programs. He and Wilhamina loved it, and

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had chosen to stay instead of moving to a Compatible Age Unit when their daughter left.

Unfortunately, they still had ten years to go on the mortgage, and maintenance and upkeep had become a continual burden on his spare time.

Willa gave him a quick kiss when he found her in the all-purpose room, but it was a perfunctory performance. Somehow the passion seemed to have gone out of their relationship, although their yearly compatibility tests still showed a high level of agreement. Royce supposed this was an inevitable consequence of twenty years of marriage, and two kids raised and sent off to the trials of adulthood.

"The Sticklemans are coming over for dinner, honey. I know you find them boring, but we owe them. Now please don't turn sulky and quiet on me. I'll put on the seashore sounds you like, and we'll get through the evening somehow. Perhaps they'll leave early. Here's your drink."

"And perhaps they won't," said Royce wearily as he headed for the rec-room and a few minutes of peace and quiet. It had been a rough day, it was going to be a boring evening, and he was no longer genuinely certain he loved Willa, no matter what the comp tests said.

He sat in his favorite formfitter, felt it adjust to support him, and called up the collected news of the day per his personal profile as he took the first sip. Perhaps something interesting had happened in the big world out there.

The all-set was barely warm when it announced an urgent message from Denise. He called it up, and learned that his father had just died. He had asked to be cremated, and his friends in Asati were attending to it. There was no need for family members to attend.

Royce leaned back with a sigh, and the chair adjusted to match. He remembered his father with affection, though he had not seen him or his mother—now dead eight years—after he left Asati.

There was little point in trying to reason with anyone who refused to go under the cap. Their views were so different . . . his parents had simply not wanted to be a part of the modern world.

Unbidden, a sudden memory of the little hidden hut near Asati came flooding into his mind. He had spent many pleasant afternoons there, drowsing away time that seemed endless, an infinite resource. . . . Royce angrily brushed away sudden tears, and rose to get himself another drink. The death of his father, the cutting of the last link with his boyhood, must have affected him more deeply than he realized.

Royce found himself wondering if there was any way he could gently hint to the Sticklemans that they should go home soon after dinner. He needed a good night's sleep. There was a tremendous amount of work to do tomorrow. . . . ■

●Patience is a necessary ingredient of genius.
Benjamin Disraeli

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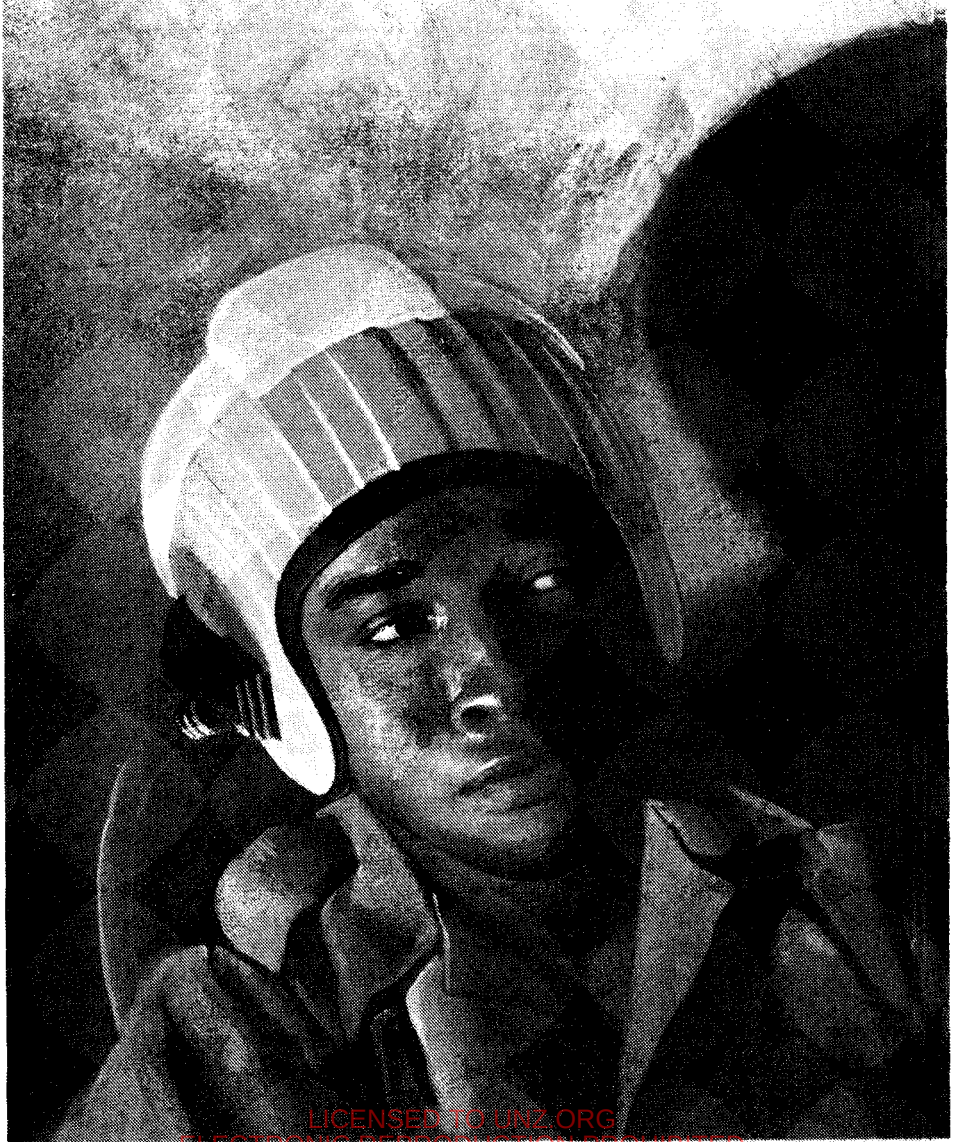

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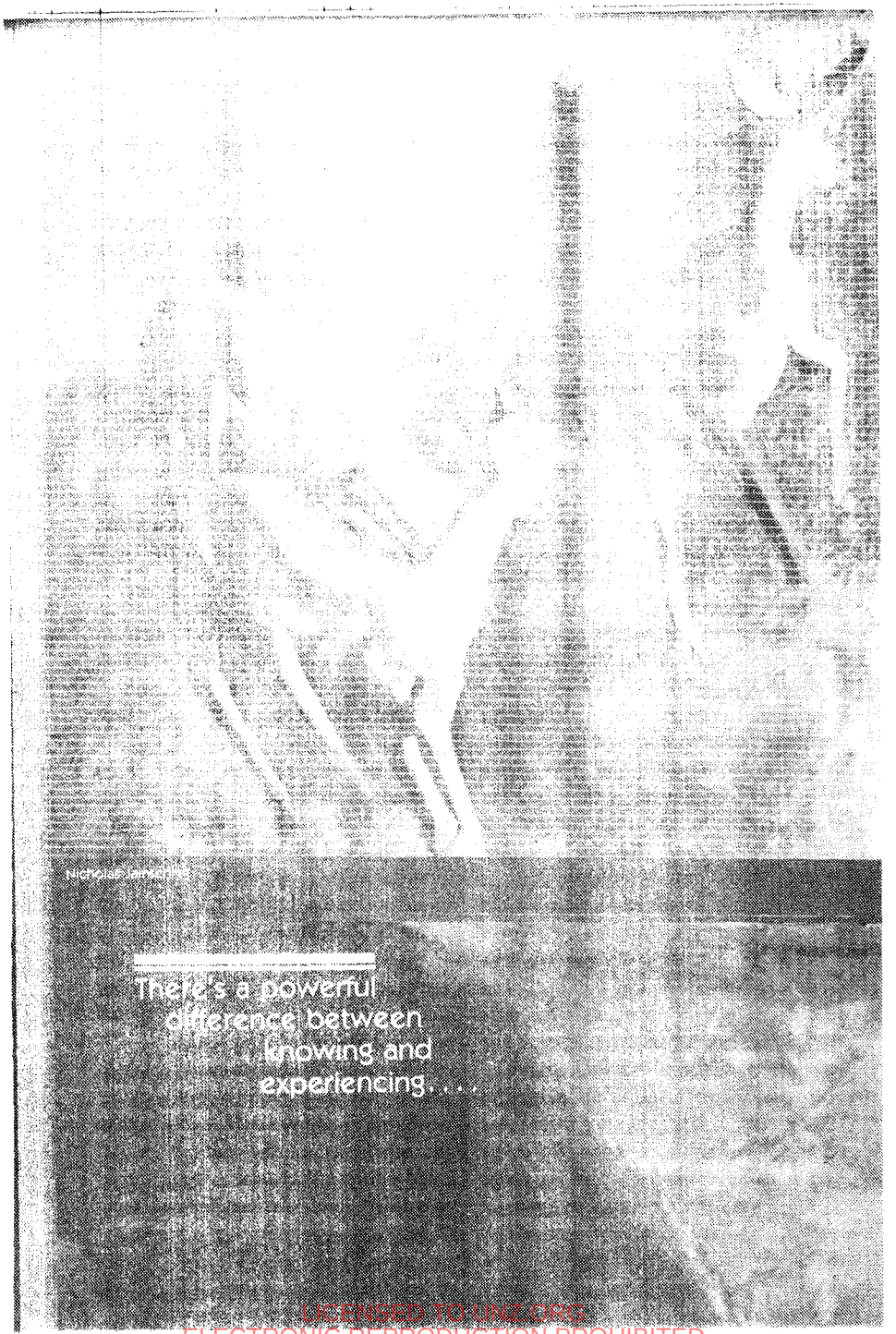

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I.

The gazelle was frozen, its eyes flicking from side to side; white in stark contrast to black. The smell of fear was thick in the air. The rest of the herd was drawing away in high bounds almost as if their legs were spring-loaded. Their flight left a trail of dusty plumes on the baked African veldt; its grasses dried to even and stiff golden strands.

But the gazelle didn't move. The green sprigs that had caught its attention were only half-eaten and hunger obviously won over fear. It bent down to nibble cautiously, eyes still scanning the surrounding area. But the droning of the locusts had gradually resumed and the gazelle relaxed. Overhead, an angry sun glared down from a clear sky so seamlessly blue that it looked like a painted ceiling.

The hunter was frozen in mid-step where the sudden flight of the panicked herd had locked it. It watched the lone buck and waited. It was downwind from its intended prey and it wanted to get closer. Then an angry chattering from the side startled it as a male ground squirrel gave a warning that sent its family diving into the burrow they shared with a pair of mongooses.

The hunter exploded forward as the angry chattering galvanized the skittish buck.

Heavy clawed feet dug into the baked earth to propel the tawny, muscled mass of the hunter towards its lean prey. The gazelle was off and running, trying to catch up with the rest of the herd. But before it could get up to speed, the hunter was on it, bearing it to the ground and clamping its eager fangs around the fragile neck. The powerful jaws closed in a vise-grip to snap the vertebrae. The hunter's head twisted from side to side in a powerful shaking motion and the gazelle went limp in its jaws; warm fresh blood flooding its mouth. . . .

" . . . and cut the duping there." Manuel laid his hand on Ashane's shoulder as he removed his sensor-helmet and looked over at her husband. "How about the gazelle? Did you get it all down?"

Kume's anachronistic and bushy Afro bobbed as he pulled off his confining sensor-helmet. "A masochist's delight. I dropped the levels on the monitor channel, but believe me, the dupe has every adrenalin surge of panic and the agony of death right to the very end."

"The end?"

"Just like the original recording from the nanoscanners, except I skipped back and did a slow fade to black at the end."

"That's not realistic," Ashane protested.

Manuel squeezed her shoulder in sympathy. "No, but it's more artistic. I don't like it either, but the studios made it very plain what they want. Kume's right. If we want their money to support the wildlife fund, we've got to play their game—"

"Besides," Kume interrupted. "We were lucky that we finally got one of our scanner-infected quarry animals paired with a predator carrying scanners."

"Really." Manuel reached past Ashane to pull the recording crystal out of her terminal and wound his way over to the other side of the equipment-cluttered lab to take Kume's from him as the older South African handed them

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over.

He eyed the optical storage chips critically, juggling them for a minute as he thought. The blades of the overhead fans spun slowly, moving the warm air of the lab around as the air conditioners struggled against all the computers they had jammed into the once spacious warehouse. At the moment, though, it seemed almost cool after the baking sun of the veldt.

Lions, prey, death.

A downbeat presentation, for all its drama. Then he thought of the perfect balance and looked back down at Ashane, who was getting ready to shut down her console.

"How about the dolphins? Did you figure out what to do about the phasing problem of the transmission during the shift from air to water?"

"Uh huh," She nodded with a bright grin. "Kume gave me an idea and I worked on it a bit." She got up to join her husband, dropping into his lap with a contented sigh. Then she blew in his ear lightly to tease him. "Once in a while he comes up with some good ideas."

They made a striking pair. Ashane was a beautiful woman with flawlessly smooth blue-black skin—much darker than Kume's even chocolate-brown—and her hair was a tight, short cap in contrast to the fluffed out, old-fashioned Afro that crowned his battered ex-boxer's face. But they were somehow made for each other. The connection between them was almost visible.

She looked back up at Manuel.

"We used paired receivers and when the signal strength drops because of submersion, the second set, ELF, kicks in automatically. Kume reprogrammed the computer to compensate for the phase shift. I've got a live feed going on another channel set right now as a test recording."

"Last time we checked," Kume continued, "it was feeding perfectly. The nanoscanner infection had spread to all the prime sensory sites and replicated to completion. The transmitter had just finished constructing itself and started broadcasting. Getting sufficient body-current to power everything was the hardest. The biochemistry of the dolphin is just a little different from the other species we've been infecting and it took us a couple of tries to get it right. Like all our other subjects it's a frustratingly weak signal, but it's a clean one now that we've placed and coordinated enough surface and subsurface re-broadcasters. Want to plug in?"

Manuel nodded and put away the storage chips before putting on his helmet again. Out of the corner of his eye, he saw Kume reach for his computer's microphone. . . .

Flying . . . floating, suspended by a warm and caressing crystal-clear cradle. Sonar signals surrounded and painted a vivid picture of the cliffs that loomed nearby, and also of the schools of fish that flitted past ahead. The flexible body wiggled and put on speed, aiming itself towards the waiting food. Then, confusion as fine trapping filaments grabbed hold and an invisible hand dragged upwards, tightening and cutting into streamlined flesh. Signals came back. A large dense object hovered above in the light. Frantic warning

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pulses streamed out. Tighter and tighter the invisible lines cut in and drew upwards. The surface broke and light flooded everywhere, deep breaths were drawn as the body twisted and bucked, trying to free itself. Then a numbing blast of sound and agony flooded up. . . .

He was on the floor; his right elbow screaming in pain from where he must have hit it on the way down.

"You all right Manuel?" Kume asked as he reached down to help remove Manuel's helmet. His face was strained.

Manuel nodded weakly and rubbed his whole tingling arm. "You?"

Kume tried a feeble smile. "Better than you. My monitor was still turned down."

Soft hands wiped his face with a moist cloth as Ashane knelt beside him. "I'm sorry, Manuel—"

"Why? It's not your fault I'm a klutz." He grinned. "As for the driftnetter and the dolphin, hey, that's the danger of a live feed. Besides, don't be too solicitous or Kume might get jealous." He got to his feet with a strong boost from the powerful African who shook his head and looked down at him somberly.

"Hardly. Only an insecure man gets jealous." Then Kume's face cracked in a grin. "Besides, you're too short."

Ashane nudged Kume in the ribs with an elbow as he put his arm around her. "Hush! He's cute. And I like his mustache. I think its sexy. Besides, he's a doctor. Be careful."

"I'm a doctor, too, or I will be once I get through my thesis defense." Kume drew himself up, barely controlling the smile that threatened to crack his face. "And as for his mustache: pooh! Besides, look at that hair: it's got no character." He dismissed Manuel with a wave. "And some doctor. He hasn't seen a human patient in the five years we've been working on the scanner project. He's as broke as we are."

"Hmm." Ashane cocked her head and then leaned closer to her husband. "He has a point." She grinned. "Sorry, Manuel. Besides, I like your wife."

Manuel smiled and shook his head as he sat down by her terminal. He was still shaky from the harsh death of the dolphin; amazed at the vividness of the signal. He had never experienced anything so strong.

He looked up at them. "You know, it's a good thing the scanners won't work with people. It's making me wonder a little, though. I know Tom Carlyle's work showed that the greater complexity and cerebellar activity of the human brain made it impossible to get a coherent signal—"

"From your brain, I might point out," Ashane giggled. "You were the only test subject."

Kume covered her mouth lightly. "Ignore her, please. What's that got to do with it? You were hooked into a dolphin."

"Just that with the dolphin we have the most intelligent mammal we've successfully scanned to date, and the signal is more powerful than anything else we've monitored. This is a complex brain we're dealing with. Why no interference here if complexity is the cause of interference?" He eyed the helmet suspiciously. "I wish Tom was still

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with us. There's something screwy here—''

''Not really,'' Ashane countered, freeing her hand by biting Kume lightly. ''It's still completely different from the human brain.'' She grinned up wickedly at her husband as he tried to recapture her. ''Beast.'' But she let herself get pulled back into his arms.

''Maybe,'' Manuel conceded, trying to keep a straight face at their usual little game. ''Definitely. . . a beast, that is. As for the dolphin's brain, I'm not sure about the differences. But first things first. The studio's pushing for the preview, so we'd better get these crystals off. I'm not sure what they'll think of the dolphin scene, but we'll see. At least we won't have to worry about the fine nuances of species differences. The mass-produced helmets for the theaters won't be as detail-producing as our lab-monitors, so it won't matter. But after the crystals go out, I've got a job for us. It just doesn't make sense that the image from that dolphin was so intense, but that we still can't interface with a human brain. We've done an awful lot of refining since Tom did that test on me—maybe we missed something?'' He looked at Ashane. ''I want to borrow you to check into that a bit. I'm getting a little nervous.''

''About what?'' Kume released Ashane and perched himself on the corner of the chair, looking puzzled.

Ashane frowned. ''I think I know what he means. He's worried about what will happen when the world sees the new scanner-derived wildlife movies we'll be supplying data for. A lot of people might ask the same question: 'what about people?' If they don't just chalk it up to better special effects.''

Manuel nodded. ''Exactly. There are going to be a lot of people wondering how we're doing it.''

''Ouch!'' Kume nodded. ''You're right. I guess it's a good thing we hid ourselves real well.''

''Yup.'' Manuel went on. ''I want to find out more about this now, so we don't get caught up in some fallout later because somebody else figures out an angle we missed. So, Ashane and I will look into human brain-interfacing again, and as for you: let's see if you're as good at programming and detecting as you think you are. As we all think you are. I'd like you to start by comparing any field data we have coming in from infected anthropoids, using the Renzler Scale of Anthropoid Intelligence. That's the most recent—'97, I think, and as far as I know it is the most accurate scale around. See if there is a difference in sensory intensity that correlates with intelligence.''

II.

The afternoon sun was magnified by the floor to ceiling sheet of glass that was the outer wall of her office. She reached out to increase the polarization before turning back to her desk. A tall skinny man stood there, archaic horn-rimmed glasses perched precariously on the end of his nose. He looked as if he was having a major ulcer-attack. ''But Ms. Daniels, the Hodgkiss reports are due in New York today—''

''Screw New York. If I don't swing this deal with the Moscow Stock Exchange in the next few hours I'm out several million dollars easy money. Now get me Nicholai in Vladivostok.

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he's checking on some background I need. And get me Towers in L.A., I promised to let him in on this for saving my ass on that scam on the Tokyo exchange.''

''I'm on it.'' Jack scrambled, after leaving a small disk lying on her desk.

She shoved it to the side and reached out to turn on her desk terminal as she inserted a worn, unlabeled disk she pulled from her purse.''Screw New York indeed. With this deal, I may buy the home office. Nobody knows about this coming merger.''

Manuel yanked off his helmet in shock and looked down at Kume. ''Where the hell is that coming from?''

''As near as I can figure, Ms. Daniels is a stockbroker with a South African brokerage firm—and from what I saw out the window, I'd say right here in Pretoria, only a few blocks away.'' Kume swiveled on his chair and took off his own helmet. ''I caught it by accident when I went off the re-transmitted signals from our field units. At first I thought I was getting interference and I kept fine-tuning and phase correcting when I caught flashes of a signal. It took a while because the composite signal comes in on several frequencies at once and they all have to be perfectly tuned and synchronized . . . anyway, once I finally got in a clear group of matched transmissions, I realized that they were on a totally different frequency arrangement than what we usually use and . . . well, you can imagine my surprise when I caught your signal. It's pretty flat and lifeless compared to what we're getting from the animals, as I'm sure you saw, but apparently your preliminary scanners are at least able to tap into primary sensory signals.''

He looked up at Ashane, oblivious to her confused expression. ''I knew you could do it. I just didn't realize you had gotten that far with them. It's only been three days since you started experimenting. I could have sworn you said you were striking out. I guess you had a breakthrough. Did some of your scanners get loose from here before you could do a controlled test?''

''What makes you think they're our scanners?'' Manuel asked, finally realizing what Kume was rattling on about.

''They're not?''

''No. You were right the first time. We're still in simulation models and striking out every time we try. Did you scan for any other signals like this one?''

''Ah, well, no. I thought they were our . . . I mean . . . well, if they're not—''

Manuel frowned. ''Try it. Scan the whole range around where you found that signal. And tap into our other monitoring stations, too.''

''Do have any idea how many frequen—''

''That's why we have computers. It has to be a composite signal on a specific number of frequencies. Give the computer the parameters of the intercepted signals and hook it in to your receivers. Obviously someone else has been working on developing scanners like ours and they're tapping into people. I want to know who, and why!''

Ashane had been silent, but she finally spoke up, her face animated. ''I'll bet I know why *we've* been having trouble. Our scanners are too good. We

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were focusing on getting the most vivid images possible out of the animals for what we're doing and the scanners we developed are great for that, but with people there *is* too much interference. But whoever's tapping into that stockbroker must have been working with the idea of eavesdropping on people from the beginning. They're working with cruder scanners that only tap into the primary senses and aren't overwhelmed by the extra signals that are swamping our scanners. Did you notice how flat and lifeless the signal was? Sight and sound only, nothing else. That proves it."

Manuel and Kume looked at each other and, after a moment, nodded. Manuel turned back to her. "That could be it. But I still want to know who the hell is doing this. Kume, sorry, but could you get going on trying to track this?"

"OK," Kume sighed and turned back to his console, pausing briefly to look back up at Manuel. "By the way, there is a positive correlation between signal strength and intelligence from the anthropoid data I went over so far. I don't have enough to give you exact numbers, yet, but as a gut feeling, I'd say it's pretty strong. So, up to a certain degree at least, the smarter, the better. Something to keep in mind for future recording."

"Thanks. Shit! So why didn't it work with people?" He shook it off. "That's going to have to wait. Right now, we have to track down these eavesdroppers. I'm going to call Mitchell at the studio and see if he can get them to hold off on releasing the clips. Obviously someone is working in the same direction as we are, but why? I want to know before we start calling attention to ourselves." He turned to Ashane. "Would you please keep monitoring that stockbroker and see what else you can find out about her? What firm she's with, for one thing. It's invasion of privacy, but at least let a woman do the invading. I'd feel uncomfortable if Kume or I did the lis—"

"Prude." Ashane stuck out her tongue, but she looked secretly pleased.

A little while later, Manuel cut off the screen on the phone in his office and leaned back to let the cold air from the overhead vent wash over him. An uneasy feeling gnawed at him. He had been too late to stop the clips from being sent out. The studio execs had gone wild about them and they had already distributed samples and prototype audience helmets to select screening audiences both in the Americas and Europe.

Mitchell, who was going to direct the picture, had not cared much about the news concerning Daniels's eavesdroppers. His dismissal of the discovery had been succinct: "As long as they're not trying to cut in on our action, I don't give a shit. They're obviously just in it for a quick buck. Don't worry about it."

Not very reassuring. Manuel didn't like the idea of someone using their discovery—what they had thought was their discovery—and doing something they couldn't do.

The door to the office opened and Ashane poked her head in.

"You done? Good."

He sat up. "I thought you were supposed to—"

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"Van Der Hoeven Investments. Her first name is Jennifer and she lives at 135—"

"All right," he laughed. "All right! How did you find out so quickly?"

"I got lucky." She came into the office. "She had to run home to get some papers she forgot and I came on just when she was ordering a cab. And she's getting anxious. She's—"

"Hurry up! Get back here," Kume's voice called from the lab.

Manuel and Ashane joined him as he was pounding the keyboard of an adjacent terminal intently while keeping a watchful eye on its screen, even while whispering into the microphone clipped to his shirt. Then he looked up.

"I'm waiting on the frequency scan to finish, and I kept an eye on Daniels while Ashane went to get you—"

"What happened?" Manuel asked.

"Her whole stock deal fell through," Kume explained. "Someone beat her to the punch."

"She was working on a deal to buy up shares in a small company that was just bought up by a conglomerate," Ashane added. "Insider trading, pure and simple."

"Yes, except someone else knew, too," Kume finished. "They bought up all available shares before Daniels could do it. She's hot!"

"Someone, as in the person whose scanners we're picking up?" Manuel guessed.

Kume nodded. "Seems that way. Apparently it's not the first time and she's tearing apart her office looking for bugs."

"Can she pick up the scanners' transmission?"

"She might be able to detect that there is some sort of a signal," Ashane answered, "but even that's doubtful. Doesn't matter. She'll never be able to make sense of it without a computer translation setup like ours."

"What was that you were keying in?" Manuel peered over Kume's shoulder at the one screen.

"The stock that was bought up, I figured maybe we could trace the buyers."

"Are you still recording Daniels?"

"Yes. I'm hoping to find out what other deals she's been burned on—"

"Find common buyers and we have our eavesdroppers?"

"Exactly."

"Unless the stocks were bought through fronts," Ashane cautioned.

Manuel perched himself on the edge of Kume's desk, his fingers tapping slowly on the underside. "Can we find them?"

"I don't see how," Kume said sourly. "Unless I find some more signals and maybe pin down where they are operating from—"

"Wait a minute!" Manuel jumped down and started pacing anxiously. "That could be our chance. The scanners are severely limited in signal strength since they have to be powered by the subject's own body. The eavesdroppers would have to have receiving and rebroadcasting stations set up near each subject. Just like we have—"

"—and there's got to be one near Daniels," Ashane cut in with a grin. "All we have to do is find it."

"It's got to be in Daniels's building, or in an adjacent one," Manuel decided. "This is going to sound crazy,

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but I want to keep all this to the three of us. What do you think about sabotaging their transmitter, if we find it, and planting a trap there with scanners cued to humans . . . assuming we can make some?" He stopped as he saw the suddenly distracted look on Ashane's face and asked her, "What's wrong?"

She was quiet for a moment, but then glanced up. "Nothing with your idea. But I just had one of my own. I've been thinking more about our own problems with the computer simulations. Maybe our trouble now isn't hardware, but software? Our new scanners are much better than the ones we tried on you and, to be safe, we're doing everything first with software simulation. That's OK, with animal specimens, but the human brain is so much more complex that perhaps our testing software can't handle all the variables involved in simulating scanners in a human brain. Daniels's eavesdroppers never had our trouble because they never worried about the type of detailed signal we're after. Let's try some new live tests, beginning with the latest anthropoid models as baseline and using simulation to configure the scanners as much as possible for a human brain. I'll volunteer. I'll bet that they'll work just fine despite the computer projections. They're safe enough now. We know—"

"You'll volunteer?" Manuel stared, remembering her aversion to the early tests. "Kume, what do you think of that?"

He shrugged. "Hey, she's over twenty-one and vaccinated. If she's willing to be a guinea pig, that's her decision and I'll respect it. I may not be *really* comfortable with it, but she's right. The scanners are safe." He swiveled back and forth slowly. "And I think she's got another point: you might be trying to handle too many variables. That would explain your problems in trying to simulate scanner use in humans." He shrugged. "But even if the more complex scanners fail, try the approach the eavesdroppers used and just tap into the primary senses. We're not doing this for the studios, just for us."

Manuel stared at the helmet in his hands. "Makes sense . . . " He turned to Ashane. "Are you sure you want to do this?"

She shook her head. "No. But something's going on here and we need to find out what it is. You did it last time and it's only fair that one of us try it this time. I can handle it, and you heard Kume: there's no danger. Besides, you two will be the only ones listening, and you're both family." For a moment she seemed extremely embarrassed and her eyes reached out to Kume, who came over and hugged her close.

"It'll be fine."

Manuel was silent for a moment and then coughed softly. "Look, I hate to break this up, but we had better get working. Before I steal your wife again, how's the frequency scan going? Did you pick up any other signals?"

Kume studied the display panel of one of the terminals and, after a moment, shook his head. "No, and the chances are slim. Our best bet is to cover the area around Daniels to try to find that transmitter. I can put together three portable directional frequency scanners that will only be triggered by a multi-phase signal like the one from Daniels's, and then we can go

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hunting."

"Good. Do it, please."

III.

A busy week later, Manuel decided to take a break and check on Kume's progress.

"Where's Ashane?" he asked as he looked around the lab curiously. "I haven't seen her all day."

"She needed to be alone," Kume explained. "For the last week she's been carrying the new scanners so we could continue testing and she finally had enough. I pulled them out and triggered the breakdown of the transmitter. I hope you don't—"

"No, of course not. We were done. Any sign of life from our trap?"

"Nah. Not yet. But since the signal from Daniels kicked in yesterday, we know they fixed the 'accidental' overload we arranged. We should know pretty soon if the trap worked and if any of the repair people got infected." He looked at his watch. "Considering the time it takes for the nanoscanners to spread to the sensory sites, plug in, replicate, link up for power and then assemble the transmitter, I expect we'll know sometime today if we caught anyone. Provided they're close enough to a rebroadcaster."

" 'Aye, there's the rub,' as the great bard said." Manuel frowned. "Those field units we pulled in and scattered around the city will help, but we can't possibly cover more than a fraction of the area."

"At least we know that since the ones bugging Daniels are also limited, they can't be too far away from her office. We're all pretty close. Frankly, I'm surprised they haven't picked up our signals."

"Uh uh." Manuel shook his head. "Most of our signals come in over the phone lines from the field. Well, if you hear—"

"Hi. Talking about me?" Ashane was standing in the doorway, a forced smile on her face.

"Not any more . . . what's wrong?" Kume asked, noticing her expression. He started to pull off his helmet and get up, but she waved him back.

"I'm OK. Keep monitoring. I'm just feeling the effects of listening in on the recordings you made of me. I had no idea how good the scanners *really* are—"

"Well, they better be. We're tapping into as many nerve junctions as possible. But are you sure you're OK?" he persisted.

"I am, *really!*" She smiled weakly. "Now tell me: what's up? You look like you have some news."

Manuel didn't quite believe her, and it was clear that Kume didn't, either, but they knew her well enough not to push it. Instead, Manuel told them about his last call.

"Well, I just had a call from Mitchell—"

"What did he say?" Ashane cut him off.

"Just that the reactions to the Lion Hunt clip we sent were overwhelmingly positive. To quote him: the audiences went wild! end quote. The dolphin shots were never sent out, but the studio wants as much gritty wildlife footage as we can get together. And they want it soon, so they can begin editing and adding dramatic footage to put together a

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worldwide broadcast, keyed in with the turn of the century next year."

"Great!" Kume's face split in a wide grin as he looked up from under the helmet. "That's the type of publicity we've been pushing for all along."

"Well, before you get too excited, why don't you take a break and let me monitor for a while." Manuel glanced briefly at Ashane, who still looked very subdued. He had a feeling she could use a moment alone with Kume.

Kume nodded, understanding, as he reached up to take off the helmet, but then he froze. "Wait a minute!" He turned to his console suddenly, and cocked his head, listening.

"I've got one!" He glanced up briefly. "Our trap paid off and our own eavesdroppers got somebody!"

Manuel grabbed a helmet and passed it over to Ashane and then put on his own, plugging both into Kume's console.

He was soon immersed in an eerie double life; standing in the slightly stuffy but sterile lab with a metal helmet clamped around his head, and at the same time riding in the passenger seat of an antique gas-powered car out in the sunshine, almost sneezing from exhaust fumes he wasn't physically smelling except by proxy.

Tall, generic office buildings thrust up from pedestrian-jammed concrete sidewalks flanking the wide city street. The open car window sent in a buffeting wash of dry air spiced with a range of urban sounds and smells. The car radio started playing an older top forty hit by a popular English female singer from the early nineties who had hit it big with a rich, genuine soul sound. Lisa somebody or other, he couldn't remember her name, but he remembered how surprised he had been when he had seen the video of her first hit and found out that she was white.

Suddenly "he" cursed and reached over to turn the radio off. "Another Kaffir!" His gutteral, snarling Afrikaans was hard to follow and the obvious flare of hatred in the voice was sickening.

"She's white," the unseen driver said.

"Doesn't sound like it to me, Karl. But if that's true, it's even worse."

"Why?"

"I don't like the idea of a good white woman humiliating herself to make money kissing up to the—"

"Ah, stuff it Eric! You're talking like van Goetzer. He hired our bodies, not our brains. This is the new South Africa now. Everyone is a human being, and according to the law: equal. They may not be as good as we are, but we're stuck with the new laws—"

"—and there's too bloody many of them voting to be able to put things right. It doesn't matter. Things will change again, you'll see. Don't make fun of van Goetzer—he's right. What we're doing will restore our rights and our land. You never really understood that. That's why you will never truly be part of the Movement." "He" looked over at the driver—an older man with thinning grey hair sitting there shaking his head. A resigned smile hovered on his face.

"If you say so, Eric. If you say so. All I know is that we're getting good money to maintain some electronic

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equipment. I don't care about more than that. I have a wife and children to feed."

"*Well, I don't anymore—*"

"*Don't care?*"

"*Don't have a wife or children. The Kaffirs killed them in the housing riots.*" *Hatred suddenly battled with intense loneliness and pain.*

Manuel snatched off his helmet, feeling vaguely ill. "Keep recording, Kume, and let me know if you hear where they're going." He stared at the thing in his hands, torn between nausea and fascination.

"I don't believe how *real* it felt. With their eavesdroppers it was like peering in a window, but with ours, it was like really being there. . . ." He shuddered. "And I don't like where I've been!"

But Kume just nodded absently as he sat staring at Ashane in shock. "Van Goetzer and The Movement! That's the same group of assholes responsible for the death of Tom's wife." He shook his head. "Damn! I still remember when he found out."

Ashane's hand was warm on Manuel's arm. "Me too. I can't blame him for going over the edge." Her hand clenched. "I don't believe they're still running around out there!"

"Karl and Eric," Manuel mused. "At least Karl doesn't seem to be a fanatic, just greedy—"

"A greedy bigot!" Ashane's jaw was clenched.

Her expression mirrored her husband's. "The latest race riots weren't that long ago." She linked hands firmly with Kume and dropped to sit next to him.

All at once, Manuel felt like he was intruding and he withdrew to his office. He wanted to call Mitchell, anyway.

IV.

"Who the hell is van Goetzer?" Paul Mitchell was leaning forward and glaring into the phone's camera. Judging from slightly puffy eyes, Manuel had a feeling he had interrupted a brief nap and tried to look contrite as he explained.

"He's an old guard fanatic who fought tooth and nail against the breaking down of the apartheid barriers. He's in hiding now, but he was a strong driving force in Orania for its brief existence, and when that was reabsorbed, he started a paramilitary force to build and protect a huge sheltered estate where he could be with his own kind. That didn't last long before he had to go into hiding. But he's been behind a lot of the racist demonstrations that have sprung up from time to time as he pulled together people who miss the good old days when only white was right. One of the nanotechnologists who worked with us in the beginning—Tom Carlyle—got caught in the sidelines of one of those demonstrations. His pregnant wife was accidentally killed when a mob got out of control. In '97."

"Oh, I'm sorry. But why is van Goetzer worrying you so much right now?"

"Because I want to know what he's up to—"

"Raising money to keep spouting bullshit, of course," Mitchell broke in, dismissing it. "It's getting harder and harder to make anyone listen to that kind of archaic ranting."

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"That's what I thought, but I was politely corrected by someone who is better placed to comment on that. No, I'm starting to think there's more to it than just fading glory grabs. We're talking major money here. Kume worked out how much money they made just on that last little coup, from what little he could track down, it was well over a million, just that one time."

Mitchell whistled. "Oh! I didn't realize." He shook his head. "So he's greedy. What's it prove?"

"Nothing, yet. Just a bad gut feeling. Once 'Lion Hunt' hits the theaters, he'll realize that someone else is doing what he is and—"

"—you're afraid he'll come after you!" Mitchell laughed. "Hell, the way you hid yourselves, no way! Relax. I can't even find you. But I have your bank account and I see deposits, major deposits coming." He closed his eyes, hands hovering like over a crystal ball. Then his eyes snapped open. "Lighten up. You're getting paranoid. Van Goetzer is an asshole who wants to retire in style with a clever scam. Don't worry about it. Now go get me some more footage like that dolphin scene you sent. That's drama! Not everyone went for it, but I have a 'feeling' about it." He leaned back and stabbed his gut. Then he reached forward and the picture disappeared into shimmering grey phosphorescence.

Manuel turned off the phone, his hands clenching. Mitchell was wrong. There was a lot more going on here than it seemed.

He got up and went back into the lab in time to see Ashane wave her hand at him.

"Plug in, quick!"

He did . . .

Karl was leaning forward to see through a sudden burst of rain that smeared the windshield. Here on the unautomated city streets, traffic was fairly thick. He glanced over briefly.

"What's bothering you, Eric?"

"I'm starting to wonder what we're doing here. We're bugging people, somehow, and it's for big money. Some of my connections have filled me in on a little of what's happening. But instead of reporting directly to van Goetzer, we're reporting to some guy named Carlyle—and not even directly, but through middlemen. I want to know what he's up to."

"Who?"

"Carlyle!" Eric snapped.

"Who is Carlyle, anyway?" Karl looked over again.

"He's the one who's got us running around. I got his name from one of the shippers who brought us the last batch of supplies. I couldn't find out anything else, though. If I can find out more about him, I'll bet I get in on some real action when we're ready to take back control of the country."

Karl sighed. "And how are you going to do that?" It was obvious he didn't care.

"Simple. I'm going to find out what Carlyle is doing with all the money he's been raking in. I know he's got to be making a damn sight more than he's telling. The Movement's getting a nice flow of cash, but what about the rest? He swears he's only keeping expenses, but if Carlyle is being straight, why is he so secretive? I'll lay you odds van

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Goetzer would love to find out if Carlyle's keeping more than his share.''

''Oh, give it a rest, Eric. This rain's getting too heavy to sit here and listen to your bitching. If Carlyle has any sense, he's living the good life and enjoying things a bit. So what if he is?''

Manuel pulled off his helmet numbly. ''Carlyle? Not Tom. It couldn't be.''

''It has a certain sick logic.'' Kume looked at Ashane, his face carefully blank. ''I've had my suspicions. Even if it seems bizarre. Who else would make scanners so similar to ours that we can pick up on the signal so easily? He was in on all our early research.''

All eyes drifted over to the far wall where a large picture hung. Kume and Ashane in a mass hug with another black couple. The man was closer to Manuel's height, a full head shorter than Kume, and seemed slender and frail by comparison. But closer inspection betrayed the tightly sculpted body of another sort of athlete. His skin was the same rich ebony as Ashane's, matching the other woman perfectly. She could have been Ashane's sister, except for the bulging of her advanced pregnancy.

Ashane walked over to the picture and stroked the swollen stomach, her jaw tight. She glared at Manuel and Kume.

''After van Goetzer's crowd killed Marilyn and his baby, do you honestly think he could be helping that murderer against our own people?'' Her eyes narrowed and Kume cringed.

''Compensation maybe?'' Manuel offered. ''He blames his own people for overreacting? Hell, there were a lot of African leaders who criticized the radicals for not ignoring van Goetzer when it was obvious he was going to get shut down anyway by the coalition government. What if he's lashing out personally because of Marilyn's death? It's the only explanation I can think of. I've read about a number of similar reactive personality changes in psych journals . . . well, maybe not.'' He shut up. It didn't sit well with him, either, and it was obvious that Ashane didn't buy it. He tried another tack. ''Hasn't Tom tried calling, or anything? I lost touch with him and I don't even know where he's at anymore. You four were so close—''

''He hasn't seen fit to ask us for help,'' Kume cut him off as Ashane went over to the window, her back a rigid exclamation mark; her face tightly controlled as she shut them out.

Manuel knew better than to say anything. If Kume didn't go to her, she didn't want comforting. He knew her best. Manuel picked up a helmet.

''Look, we better keep monitoring. Maybe we'll learn something more.''

Kume nodded. '' 'Shana, do you want to plug in?'' He looked over and held out a helmet. ''We need to know.''

She didn't say a word, but just grabbed the helmet on her way past him and then sat down on the other side of the counter at her own desk, ignoring Kume and Manuel. ''Feed it over here, please.'' She didn't look at them.

''Sure.'' Kume spoke softly into his microphone as he sat down and put on his own helmet.

Manuel plugged his helmet into Kume's terminal.

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* * *

"Eric, I have a feeling that you two are probably wondering about all the money I've been getting from our operations, and what I'm doing with it." Eric stared at the abstract pattern on the blanked phone screen as the familiar deep voice went on. "Well, I've been planning a little project of my own. It involves getting scanned footage of black violence against us—which will be easy to get or fake. Then I plan to hook it into that worldwide broadcast the movie studio is planning. And I want you to present that plan to your bosses. No offense, Karl, you have been invaluable, too, but I think a more material reward might make you happier, so you'll get a good bonus on your next check. But you, Eric, deserve recognition for the faithful service you have been doing for your race. When you present this, van Goetzer is bound to take you into his confidence and give you that chance you probably want. Your leader has planned well from his hiding place and he will soon be in position to strike a major blow for our side. But he made one error. He thinks there is more support for his views than there actually is, and so he may fail again. But with my broadcast to pave the way, he'll have all the support he could hope for."

"And you want me to present this? Why don't you do it and take the credit?"

Carlyle laughed. "Believe it or not, van Goetzer still doesn't trust me, and I have to go through you unless he calls me. But in this case it doesn't matter. I'll have my share of credit—both fiscally and otherwise. After all, it's my plan that is financing him to a large extent and I'm the one who is designing the scanners, so van Goetzer already knows how much he owes me. But I like my privacy. Also, as you may have guessed, I have been keeping a decent share of my proceeds for myself and I'd like to enjoy that. Now, contact your boss and let him know what you have planned, but don't give the details. Insist on speaking to van Goetzer himself and don't tell anyone else just what we're planning or they'll take the credit and bury you. Let me know what happens."

The phone-screen went totally black for a moment and then the normal decorative stand-by pattern resumed flickering.

Karl reached over to turn off the phone. "Well, you got your wish, and I got mine. Now shut up and plan your presentation so you can get your reward. I'll wait for mine in the mail."

"That was Tom," Kume admitted reluctantly. "I'd know his voice anywhere." He leaned over towards the phone and typed in a directory request, but nothing came up except an old disconnected listing.

Ashane was suddenly heading for the door out into the hall, and she turned briefly as she reached it.

"Let me see if we can track him down through some of his old friends that I know. Maybe he's kept in touch with them." Then she disappeared into the hall and Manuel looked over at Kume.

"What's with her?"

Kume shrugged, but his face was troubled. "She and Marilyn were real

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close, almost like sisters. They both came from poor backgrounds, married professional men, and then educated themselves. It made for a bond between them. That's all. It must have come as quite a shock to see how Tom's been twisted—''

Manuel studied Kume's face. After five years of constantly working together, he knew the large man better than his own brother back in L.A. and there was no doubt in his mind: Kume was lying.

''That's not all there is to it and you know it. What the hell is going on?''

''Nothing!'' Kume turned away, his face blank as he started to put his helmet back on, but Manuel got up and went over to grab it from him.

''Bullshit! We've been friends too long . . . I know you. Don't lie to—''

''Back off, Manuel!'' Kume stood up, his voice harsh as he towered over Manuel. ''You don't underst—''

''You back off!'' Manuel glared back up. ''Who the hell do you think you're talking to? We're family! Ashane's really upset about something and you know what it is but you're not doing a damn thing. I know she wants to handle her own problems but you've always been there for her and right now you don't seem to give a shit.''

Kume flinched. ''I do care!'' Pushing Manuel aside through sheer force, he headed for the door.

Manuel ducked past him and blocked it. ''If you go through this door, don't bother coming back. We've never lied to each other or kept anything from each other before, and I won't take it.''

For a moment he thought Kume would just push past him, but then the large South African froze and stood unmoving, his eyes focused on the helmet Manuel had tossed onto the counter next to his terminal. Finally he turned back and walked to his terminal to drop onto his chair heavily. He spun away and sat silent for a long time, staring at his clenched hands. His head shook slowly and the massive hands flexed rhythmically. Finally he sighed and seemed to sag slightly as he turned back to Manuel.

''We have been lying,'' Kume admitted. ''We've known about Tom all along.'' Manuel dropped into a chair, shocked, and Kume looked down briefly. ''I'm afraid so. He called us . . . oh, I guess about six months ago to see how we were progressing on the scanners. He was,'' he waved his hands uncertainly, ''different. Hyper, and real secretive. And he didn't want us to tell you he had called. He kept pushing, trying to get us to give him the designs for our scanners. He had gotten fairly far in developing scanners based on the work we did when he was still with us, and by sticking to sight and sound only and not trying to be as sophisticated as we were. But he had been trying to refine that further and to make it work with people, but that's where he started having problems and wanted our help. 'Shana and I both felt real uncomfortable about his call and we didn't help him. We told him he would have to call you.''

''And that was the end of it?''

''Yes . . . well—''

''Well what?''

Kume looked uncomfortable. ''Well, that *was* it, as far as I know, but 'Shana's been real touchy about the

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whole thing lately. I almost wonder if she hasn't been in contact with him again. She always was closer to him and Marilyn than I was. Maybe he called when she was alone and she got roped into helping him somehow. She obviously hasn't given him our secrets, but maybe she has helped him with his own scanners."

"That would explain why she was so upset just now when she found out he's working with those assholes of van Goetzer's," Manuel mused. "Have you asked her about it?"

"No. I figured she'd tell me about it when she was ready. We don't keep things from each—"

"You're wrong, dear." Ashane had come back in without them realizing it and she moved past Manuel to sit down next to Kume. Her face was moist. "Tom called back a few days later while you were at that conference in Paris and Manuel was in New York—"

"Why didn't you tell me?" Kume reached out and pulled her close, one hand kneading her neck gently.

"I don't know . . . we were talking about Marilyn and the baby for a long time . . . it was a boy you know. Tom hadn't wanted to know, but Marilyn couldn't resist finding out. She had been so excited. It was what Tom had been hoping for. Then, suddenly I was blabbing about our work here . . . I was afraid of telling you that I had given away some of what we had learned."

"It's all right." He hugged her tight.

Manuel went up to them and laid a hand on her shoulder, ignoring Kume's irritated look. "There's more, isn't there?"

She nodded and squirmed out of Kume's embrace, reaching up with her shoulders to wipe her eyes dry as she stood up to face Manuel.

"Afraid so. Once I had started helping him, it was easy to go on . . . it was easier than to admit what I was doing to you. I've been sabotaging our attempts to develop scanners for people. There was no software problem or problem with interference from a human's more complex brain. Just me changing a few parameters here and there while you weren't looking, and talking fast every time you thought about trying again. In the meantime I was helping him to interface with people without using our more advanced scanners, just what he had developed on his own—"

Kume stared. "*You* helped him develop the scanners for Daniels—"

"—and several other brokers, company CEOs, and such. He told me he was using the money anonymously to finance relief and educational programs for our poor. We are equal according to the law, now—and even in the eyes of more and more people—but we can't compete properly until we have the education and resources to get the good jobs and get into the mainstream. Too many people are barely out of a primitive tribal society, trying to adjust to a modern world. And not just here in South Africa, but all over the continent. Hell, Manuel, look at your own country: many of our people still fight for assimilation there. Equality still has a long way to go even in the 'great melting pot.' That's why I was helping him. I was afraid to tell you because what we were doing was illegal."

Manuel bit his lip. "And now you find out that that money has been going

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to people like van Goetzer instead. Ouch!''

''Exactly!'' She looked back at Kume briefly. ''Now do you understand why I'm upset? I've been helping him against our own people! I just tried to track him down, but he's cut off the line I used to reach him before and I can't get a lead on him anywhere!''

''So why did you stop screwing up my attempts to make people-scanners?'' Manuel asked. ''You didn't know about him then.''

Ashane's mouth was a tight slash. ''Because he asked me to help you develop the best scanners possible if I wouldn't help him do it. He wanted Eric bugged. He said he was going to move Eric up in the hierarchy of the Movement and through him, show the whole world what they are.''

''Good idea, except he's doing the exact opposite!'' Kume growled. ''But at least that explains how he knew Eric wanted to track him down, and why he contacted Eric, just now.''

''I just can't believe Tom turning against everything he believes in,'' Ashane protested in a low voice. ''He's never had anything but contempt for people like van Goetzer. That's why he changed his name. He was tired of people not retaining his services just because he had an African surname. Most of his clients never saw him personally or on the phone, so it wasn't a problem in his consulting work. He hated—''

''He hated bigots?'' Manuel ventured.

''Exactly.''

''Seems to me once you get in the habit of hating, the targets sometimes get blurred.'' Manuel shrugged. ''That may sound clichéd, but it's often true.'' He reached out to take her hand briefly. ''Don't blame yourself. From what I understand, the radicals who accidentally killed Marilyn were a pretty militant group. Remember what I said about compensation? It happens that people can go from hating a few responsible individuals and then generalize it. Why he's helping van Goetzer, I can't understand. But he may not have gotten to that yet. He may still be focused on those directly responsible for Marilyn's death. And there's something else, too. I hate to raise this possibility, but consider the fact that Tom built up his consulting business in Europe and America where he went to school and never identified with the African experience. It wasn't until he met Marilyn on a business trip that he got interested in discovering his roots. He was from a rich family in Ethiopia and never knew much other than that, Europe and America—''

Ashane pulled away from him. ''You're saying it's easier for him to lash out against Africans because he doesn't feel they're his people?'' Her body rejected the idea.

Kume's face had been running through a wide range of expressions as they spoke, but settled finally on reluctant pity. ''That makes sense, 'Shana. It still hurts, but when combined with everything else, it makes a certain twisted sense—''

Manuel nodded. ''When coupled with Marilyn's death, yes. I don't know, but it's the only explanation I can think of.'' Ashane obviously didn't buy it and he gave up. ''Look, whatever Tom's problem is, we have to find out

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what's *really* going on. We've got to figure out what to do."

"Start by keeping an eye on Eric," Kume said immediately and turned back to his terminal to slip on his helmet. "We've got to find Tom. Obviously he is using our own scanners to keep tabs on Eric. He's got to figure that since we bugged Eric, we know about his plans. And that means he has to move quickly before we try to stop him."

Manuel nodded. "You're right. We have to find van Goetzer and Tom before they can implement their plan, whatever it is." He leaned forward. " 'Shana, I'm sorry, but could you please speed through the recorded scan to make sure we haven't missed anything? And Kume?" He waited till Kume looked up, only half paying attention to him. "We'll have to cover Eric live, in shifts, to make sure we keep track of what he's doing. Sooner or later he'll be getting together for a meeting with van Goetzer and we've got to be 'there.' "

"Can't we call the police, or somebody?" Ashane wondered.

Manuel shook his head. "And say what?"

"They've been involved in stock fraud!"

Manuel shook his head. "Prove it without implicating us for breaking the Right to Privacy Act of '94. And we're probably violating a bunch of broadcasting laws, too."

"Ouch!" She slumped and leaned into Kume with a sigh. She was obviously distressed over the idea that Tom was somehow involved. But Kume just gave her an absentminded kiss and brief hug before concentrating on Eric's transmission, so she got up after a moment and sat down at her own terminal to go through the earlier recordings.

Manuel, in the meantime, went upstairs to his apartment to lie down for a couple of hours so that Kume and Ashane could take some time together later to talk. He had a feeling they needed to.

He only had an hour before his intercom rang, and he groped for the answer bar to see Kume stare out from the screen.

"What is it?" he mumbled.

"Sorry, Manuel. Eric just made a call and he's heading over to meet van Goetzer now. And get this! The meeting is at the Henderson Tower."

"The Henderson?" All at once, he was wide awake. "That's just down the block! Do you mean to tell me van Goetzer's been that close all this time?"

"You got me. But that's where they're meeting. It's pretty logical. It's owned by old money—one of the few left that is—and it's got a heliport for quick entries and exits."

"I'll be right there!" He threw his clothes back on and hurried down to the lab where Ashane sat under the helmet.

"Well Kume, just what did you hear?"

"Actually, 'Shana heard part of it on reviewing. Eric had called van Goetzer's people earlier and laid out his proposal very briefly, just like Tom told him to. And, as Tom expected, when he refused to give details except to van Goetzer himself, he was told to wait. Then, van Goetzer called them and Eric laid out Carlyle's plan. He didn't have much time, but the plan must have fitted well with whatever van Goetzer has

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planned, because he invited them to join a closed group meeting of the Movement—''

''—at the Henderson.''

''Exactly.''

Suddenly Ashane began waving frantically.

''Plug in, damn it! And get ready to call the police!''

''Well, well. What have we here?'' Eric shoved the half-conscious African back down on the ground, gun barrel digging into his cheek. ''Thought you'd have a nice Sunday afternoon mugging, didn't you?'' He turned to the older white man who was staring down at them in surprise. ''Get lost! I'll deal with this.''

''Right! He was trying to rob me—''

''Go on! Get out of here!''

The man ran, torn coattails flapping as he disappeared around the corner out onto the main street.

''Eric! Don't be stupid,'' Karl warned from behind as he climbed out of the passenger seat of the car Eric had barreled into the alley with. Trash cans, cardboard boxes, and piles of garbage had been scattered everywhere. Around them, bleak, bare concrete walls climbed upwards, devoid of any windows. A strong smell of urine and rotting garbage hung in the air.

Eric laughed. ''Hey, I probably saved that man's life.'' His heart was pounding from the adrenalin rush. ''That black bastard had a gun on him and was forcing him onto the ground. Who knows what he was going to do. Might even have been trying to rape him. They're all a bunch of unnatural bastards, anyway.''

The man on the ground was moaning and half-retching as he moved weakly, digging in his coat pocket.

Eric slammed the gun barrel on his wrist. ''Ah ah aah! Naughty, naughty. What are you looking for? Another gun?'' he reached down and fumbled around in the large pocket, fingers closing on something rectangular and hard. He pulled it out. It was a folded leather case which he flipped open to reveal a gold badge and a police I.D., the black man's face prominently displayed.

''Shit!'' Karl exclaimed, coming up behind them. ''Now you've done it. He's a detective! He was probably making an arrest and you let the suspect get away. Oh, great! Van Goetzer's going to love—''

''Shut up, damn it!'' Eric snapped. ''You fool! He probably heard you. I might have been able to explain, but you just blew it.''

The man on the ground slumped, unconscious again.

Karl bent down next to him, checking the officer's eyes. ''You ran into him too hard with the car. He's really hurt.''

''He's going to be dead.'' Eric said calmly. ''He might have heard van Goetzer's name, and you know we can't bring him into anything like this.''

''What are you talking about?'' Karl's eyes were wide.

''Just this.'' Eric had been looking around, but the alley was devoid of life, every doorway sealed tight. He turned the officer on his back and stripped off his light jacket to wad it into a ball. Then he pressed the gun against the right side of the upper chest, cushioned by the crumpled jacket, and carefully pulled the trigger twice shifting aim

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slightly. Two muffled thuds rang out and the body jerked, once, twice before lying still. Eric reached down to check the carotid pulse and feeling nothing, nodded and stood up, grabbing Karl's arm to urge him back to the car.

"Done. Let's go!"

Karl followed, a dazed and sick look covering his face. "You're crazy!"

They stared at each other numbly, Manuel reaching for the phone. Kume stopped him.

"You can't!" His face was anguished.

"What the hell do you mean?" Ashane and Manuel burst out together. "We've *got* to call the police," Manuel added. "I just couldn't pull free to do it!"

"You can't call because we would get the blame!" Kume snapped back. "Think about it! We know where—I recognized the area—and we know how it happened. Who else but the murderer would know that? It's done with now. What's going to happen once van Goetzer gets his way? If Eric is that callous, what does The Movement have planned? If we get arrested now, we'll never find out, and nobody will believe us in time to do anything. Everything is coming down now! The meeting is about to start! We've got to 'be' there. If you call the police, they'll have a voice print and an automatic display of our number and address and we'll never have a chance to stop van Goetzer!"

"He's right, Manny." A soft hand touched his arm lightly. Only two people could to get away with that nickname, Ashane, and his wife who was away on business. Ashane looked sick, but she was nodding. "We have to wait. That officer is dead. We can't change that. *We have to stop van Goetzer.*" Her hand clamped on Manuel's arm.

He stared at them and swallowed. "Yes, it is personal."

"They killed Marilyn and her baby," Ashane said softly. "Let us get them on record—"

"Well, in that case, you need more than just a recording of a meeting of assholes planning trouble!" Manuel got up resolutely, a formless suspicion that had been haunting him suddenly crystallizing as he headed for the door.

He looked back. "Where is the meeting?"

"Second floor ball room, but why—"

"Good, keep scanning, and record everything. And Ashane, call the police and tell them to get over there."

Kume stared at him, confused. "I told you, we can't call the police without implicating ourselves."

"Too bad. This is to stop another killing. I don't believe I didn't see it before! I may be wrong, but I think I know what's really going on here."

Both of them looked confused for a moment, and then Kume's eyes widened and he moved for the phone. Ashane was right with him as she threw her helmet on, understanding dawning on their faces.

V.

The morning air was surprisingly crisp outside as he ran across the street, dodging the light weekend traffic. Manuel hoped he wasn't overreacting or he would have to do some very fast talking when the police showed up, but he had

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a sinking feeling he was right.

As he pounded through the cavernous lobby of the Henderson office complex, heading for the information desk, he was followed by a wake of raised eyebrows that crested when he paused breathlessly to ask where the ball room was. It took a moment before he was hesitantly pointed in the right direction. A stone-faced guard was stationed at the door, though, and he felt a surge of doubt again as the crew-cut behemoth blocked his way. What if he was wrong?

"This is a private meeting." A massive hand was held up to stop him as he reached for the door handle.

"I have an invitation."

"You?" The question reeked scorn and Manuel felt a surge of anger come over him. For the first time, he was intensely aware of his obvious Hispanic blood and he glared up.

"That's right! I'm here to demonstrate what they're trying to rid the world of. Now get your ass out of the way or call van Goetzer, Karl, or Eric out here to vouch for me. And explain why you can't do a simple job like guarding the door! Higher races, indeed!"

Manuel could almost hear the grinding of metal gears as the familiar names and his attitude threw the guard off balance. Finally, the guard moved aside and opened the door, his eyes burning down. Manuel tipped an imaginary hat and waltzed past, drawing a deep breath as the door closed behind him.

As he walked into the huge conference room, he started to wonder if it had been a stupid idea to come here.

Several dozen people were seated in folding chairs lined up in front of an elevated stage with a podium, where a startled-looking man in his sixties stood with his mouth open and one arm raised as if to make a point.

Van Goetzer.

Funny. He just looked like a nice old man, not a violent fanatic. Manuel forced himself to focus on why he was here.

"What the hell is the meaning of this?" van Goetzer's heavily accented voice demanded.

Manuel took another deep breath, the plan he had been formulating on the way over coming together in his mind.

"If you really want to know," he answered lightly, scanning the shadows in the back of the stage. "I'm here to stop your plans by letting you know that we can expose them at a moment's notice. But, to make it a littler easier, I'm also here to save your life, and probably Eric's, too. Much as I have to admit that I don't give a rat's ass about either one of you."

Van Goetzer leaned back. "Stop my . . . wait a minute, you're going to save *me?* From whom?"

"Not so fast. First I want some answers from you. I'm willing to trade information."

"What do you want to know?"

"Would you believe I'm just dying to hear, first-hand, a statement from you about race-relations in South Africa today and why you are here?"

"Why? If you know about my plans, you know how I feel."

Manuel smiled. "Humor me. Let's just say I want to hear it straight from the . . . straight from you. As for why? Let's just say that that's another part of

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what I'll give you afterwards. Two for one. Best deal in town. I'll save your life *and* satisfy your curiosity."

As he spoke, he scanned the audience, spotting Karl in the front row and, next to him, a confused-looking man who had to be Eric. Perfectly placed to see and hear everything. And Kume and Ashane were recording every word and expression. He smiled as van Goetzer shrugged amiably.

"Well, why not? I'll have to repeat myself a little—but that's part of why I'm here in the first place."

"To drum up a little support and financing, I take it?" Manuel guessed, taking in the obvious affluence of most of the audience.

Van Goetzer nodded. "Precisely. I am not alone in feeling wronged. This was our land. My ancestors came here and broke their backs to build a home here. It was our land. There were few blacks here. They came after they saw what we were building and wanted to take from us what we built with our sweat and blood. . . ."

Van Goetzer was off and running. Calm and controlled at first, he grew increasingly emotional as he vented his beliefs and frustrations. It was clear that he had never forgiven his expulsion from a posh government position when the coalition government had been phased in and the last legal and social barriers had been torn down—unofficial as well as official.

Manuel stood silent as van Goetzer talked, increasingly aware of two things. First, that he was tired of standing, and that he was becoming increasingly nauseated by the strident rhetoric. There was an unsettling undercurrent of hatred in the words. Hatred, and fear, he sensed.

Enough! He stepped forward and raised a hand. "Mr. van Goetzer. I think I have a good idea of how you feel now and it would only be fair to explain why I'm—"

"No! Not yet!" A tall figure stepped out of the shadows from a hiding place at the back of the small stage, and the room drew a collective breath as everyone saw the rich, flawlessly complexioned blue-black skin. "Keep recording," the newcomer said to Eric, who tried to shrink in his seat, obviously recognizing the voice. Then he went on cheerily.

"Hi, Manny. Long time, no see. Sorry, I know you hate that name, but Manuel sounds so bloody stuffy. I'm afraid I've stirred things up a bit. Where are 'Shana and Kume? Back recording all this?"

Manuel nodded. "Hi Tom. Long time no see." He tried to keep it light, but he was worried about the little edge in the voice and the strained expression as Tom went on.

"That's what my people are doing, you know. 'Shana gave me the frequencies before she got disillusioned with me."

Manuel swallowed, seeing he had been right. "You're right on cue, you know. I just wish you'd change your mind."

Tom shook his head sadly as Van Goetzer cleared his throat.

"I'm going to repeat myself. What the hell is going on?" The older man had obviously lost his patience and was glaring at Manuel. Then he looked back at Tom. "And who the hell are you, and

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how do you know *him?*'' He nodded in Eric's direction.

Eric looked trapped. ''But I *don't* know—''

''Maybe I can explain,'' Manuel interrupted. It was time to try to take back control again. ''Mr. van Goetzer, the reason I came here—''

''—was to stop me from killing you,'' Tom finished. ''I'm Tom Carlyle.'' Van Goetzer's stared at him, mouth open.

''You're Tom Car . . . but . . . ''

He stopped as an enormous glittering handgun suddenly appeared from inside Tom's loose overcoat.

''Be quiet!'' As the gun swung to cover van Goetzer, Tom's features twisted with hatred. ''This is a .44 magnum automatic. A bullet from it—depending on the slug—will go through half a dozen people.'' Every eye in the room was fixed with fascination on the glittering chrome barrel and its vented rib.

Manuel would have preferred a less graphic description of the gun's capabilities. He moved forward . . . to face a gaping muzzle opening that looked as if it could have accommodated a broom handle comfortably.

''Please don't interfere, Manny,'' Tom pleaded. ''I have to do this quick before I lose my nerve.''

''This isn't the answer, Tom. You know it. This isn't you!''

''Are you kidding? Marilyn and our child are dead because of him!'' Suddenly ice and resolve again. ''And Eric, there,'' the gun swung briefly over to the cringing figure in the front row, ''killed that policeman because of him.''

''An eye for an eye?''

Tom sighed and shook his head. ''You don't understand, do you? Revenge isn't everything. This is all being recorded. Enough of this will be spread around—hooked onto your precious nature movie by people I have planted—so that the whole world will see this at the turn of the century. And even if not on your planned world-wide broadcast, in some other way. Nanoscanner films are going to be all the rage soon and my people will have no trouble slipping recording crystals into at least some projectors. Sooner or later they will expose this collection of anachronistic raving hate-mongers for the whole world to see.''

''OK, Tom. But you've already done that. Soon the world *will* see it. But don't kill him. You'll just make him into a martyr. Don't you see? They'll just think of you as a blood-thirsty nigger who killed a white man. You'll destroy everything you tried to do; and destroy a slowly growing understanding—God, I sound preachy! But damn—''

''*You* still don't understand, Manny.'' Tom shook his head, a sad smile on his face. ''You're a good friend, man, and I love you for that, but I come from a family where we take our debts very seriously.'' He turned to van Goetzer who blanched and tried to back away, but the wall behind him blocked the older man's retreat.

''It's time, I'm afraid.'' Tom's face was totally devoid of emotion as he said softly, ''the blood of my wife, my child, and that policeman, is on your hands. And now, so is mine.'' He turned his back on van Goetzer and

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closed his eyes as he put the barrel of the gun into his own mouth and, aiming carefully upwards, pulled the trigger with a harsh jerk.

Triple explosions drenched the room: mind-numbing and echoing thunder, the stench of cordite; and a flood of wetness that splashed back to soak the cringing, sobbing figure of van Goetzer who dropped to the floor in a faint. Tom's body stood upright for a moment, a formless bloody mass propped on his shoulders, and then it collapsed like a puppet whose strings had been cut. It was almost clean, only part of the shirt was stained.

Manuel stood frozen, numb with shock. He had seen trauma victims as bad during his internship and residency, but they had been postmortem objects of clinical observation and study—not a friend blowing his own head off right in front of him.

The doors to the ball room opened suddenly, only a muted thud audible as they slammed back against the walls to admit the anxious Ashane and Kume. Manuel realized his ears were still ringing from the sound of the gun. Ashane ran towards Tom's body but Manuel reached out to snare her, helped by Kume who was right behind her.

The grey pallor on Kume's face betrayed his own shock as he turned Ashane away from the slumped figure on the floor.

"No honey, don't! There's nothing you can do. He's gone." He eased her into Manuel's arms and stalked towards van Goetzer.

The Movement leader was just picking himself off the floor. His face was slack and his eyes unfocused as he dabbed ineffectually at the pieces of bone and brain that were spattered over his face and body. His white shirt was streaked with red.

Kume stood over him, and helped him to his feet; his face a panorama of emotions. Momentary fury that faded into grief and then to reluctant pity.

"He shot himself," van Goetzer giggled. "I'm safe. See? I'm safe. Thank you, young man." He didn't even look at Kume. "I guess I really ought to go take a shower, though, before I go home. I've got a dinner party this evening and I just know that Christina won't tolerate it if I come in like this. I mean it might upset the guests. . . ." His voice trailed off into incomprehensible mumbles as two of the Movement "guards" escorted him off the stage, steering well clear of Kume's towering figure.

Police were outside the wide open doors, holding back a quickly gathering crowd, and as the dazed and queasy Movement members left, they were efficiently snared and led away for questioning. Manuel sank onto a chair as an officer outlined the body. His legs were virtually limp and he felt empty, distant. Closer to the door, Kume stood holding a sobbing Ashane tight, gently stroking her hair.

No one looked at the body sprawled on the stage as the questions began. . . .

VI.

The three of them sat facing the phone screen, Mitchell's florid face beaming out at them.

"I wanted to thank you all for everything. The broadcast's all set. In exactly," he glanced at his watch, "eight

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hours and forty-five minutes it will run, timed as the 21st century begins . . . well, technically it's not till 2001, but no one really 'feels' that. Besides, your revised film is ready now, and it will be seen and marveled at worldwide. I can't thank you enough. You've done an incredible job putting it together and it should be one hell of a box-office hit."

"How do the rest of your people feel about the changes we made?" Manuel wondered.

Mitchell shrugged. "Well, some of us were a little nervous at first, but once the confidential test market reports came in, they cheered up. The film *is* radical, but it's sensational stuff, and the receipts that the accountants are projecting did a lot to ease our minds. There have already been leaks—"

"Carefully orchestrated I'm sure." Manuel teased.

"True, but that's publicity's role. Anyway, the leaks, and surveys afterward, show that the interest in the film is real strong and growing daily. This will really give audiences a feel for the urgency of your wildlife conservation efforts—"

"—and give them sensationalism," Ashane put in, cynically.

"True," Manuel admitted, "but it will get our point across. After what happened with Tom, our original plans seemed a bit tame. A little stronger approach is needed if people are going to understand the urgency of saving our vanishing wildlife." Manuel felt almost giddy when he thought about the whole world watching their work. Luckily, Mitchell had been a closet conservationist and had really rallied behind their changes.

"Well, make sure you get down to the theater early for the press party," Mitchell urged. "And take care. I've got to run home and change." The image wavered and then disappeared.

Manuel leaned back and glanced at Kume and Ashane.

"How many copies of Tom's crystals do you think his people will be able to slip in after the film?"

Kume smiled sadly. "I don't know, but I can't wait to see the newscasts afterwards."

Ashane grabbed his arm tightly, looking a little worried. "You do realize that they'll come after us, don't you?"

Manuel shrugged. "Hey, they can't prove we knew anything about it. As far as they can prove, Tom's people will have acted on their own. We turned in all our records and data."

Kume held out a large hand. "I don't care. It'll be worth it!"

"Amen to that, brother!" Manual grabbed the hand and shook hard. Ashane's soft palm dropped over theirs and pulled them towards the ceiling.

"With all respect to Dumas: to Tom!"

Swelling music teases the eyes and ears as a point of light grows out of the darkness. An open expanse of African veldt surrounds. A wealth of chattering sounds and dry scents overwhelms the senses. A voice speaks out from all around. A female voice. Sensuous, yet dignified and serene. Ageless, wise.

"Behold, the wilderness. One of a few remaining refugees for a shrinking number of animal species. Come with

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me on a journey to explore them and, for a little while, live with me and experience a different world . . . a dying world. Among other lives which you will enter, you will live as an animal on these plains, and as a dolphin in the oceans. But as with any feature film, there is a preview of coming attractions. In this case, though, 'attractions' may be the wrong word. It depends on you." The voice fades and new sensations and images overwhelm. . . .

The veldt still surrounds, but it looks somehow different. Somehow abstract and colorless. Below, wide clawed and furred feet move silently, leisurely. Running alongside is a small shape. A lion cub. No, two. A little farther back, a second cub is clumsily stalking. Oversized soft feet trip on the rough ground and the second cub falls over just as he is about to pounce. The world stops moving as a bitter scent is caught off a shift in the strong wind. Sounds. Strange, ugly sounds.

"But she's got cubs!"

"So we'll sell them to the zoo. The mother's skin will bring a fortune!"

A metallic click. A crash of thunder and pain and then the ground rushes up, fading. The cubs come running up, confused. Tiny rough tongues stroke in concern, but the sensation fades along with the light.

Scene shift.

Flying . . . floating, suspended by a warm and caressing crystal-clear cradle. Sonar signals surround and paint a vivid picture of the cliffs that loom nearby, and also of the schools of fish that flit past ahead. The flexible body wiggles and puts on speed aiming itself towards the waiting food. Then, confusion as fine trapping filaments grab hold and an invisible hand drags upwards, tightening and cutting into streamlined flesh. Signals come back. A large dense object hovers above in the light. Frantic warning pulses stream out. Tighter and tighter the invisible lines cut in and draw upwards. The surface breaks, light floods everywhere, and deep breaths are drawn as the body twists and bucks, trying to free itself.

Then a numbing blast of sound and agony floods up—

Scene shift.

Static, darkness, then a voice. Deep and rich. "There is another species to be concerned about before we return you to the movie. A species not in danger of extinction! Listen and watch for a moment!" The darkness seems to shimmer, and then the smells of dust, exhaust, and garbage grows strong. . . . Point of view, normal city alley seen from a human vantage point. . . .

"Well, well. What have we here?" He shoved the half-conscious African back down on the ground, gun-barrel digging into his cheek. "Thought you'd have a nice Sunday afternoon mugging, didn't you?" He turned to the older white man who was staring down at them in surprise. "Get lost! I'll deal with this."

"Right! He was trying to rob me—"

"Go on! Get out of here!"

The man ran, torn coattails flapping as he disappeared around the corner out onto the main street.

"Eric! Don't be stupid. . . ." ■

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the reference library

By Tom Easton

Use of Weapons, Iain M. Banks, Bantam, $4.99, 389 pp. (ISBN:0-553-29224-2).
Mars, Ben Bova, Bantam, $20, 502 pp. (ISBN:0-553-07892-5).
The Memory of Earth, Orson Scott Card, TOR, $20.95, 294 pp. (ISBN:0-312-85279-7).
Mercycle, Piers Anthony, Tafford Publishing (P.O. Box 271804, Houston TX 77277), $19.95, 262 pp. (ISBN:0-9623712-6-2).
Mother Lode, Zach Hughes, DAW, $4.99, 208 pp. (ISBN:0-88677-497-7).
Storeys from the Old Hotel, Gene Wolfe, TOR, 21.95, 333 + xviii pp. (ISBN:0-312-85208-8).
Requiem, Yoji Kondo, ed., TOR, $21.95, 341 pp. (ISBN:0-312-85168-5).
The Science-Fantasy Publishers: A Critical and Bibliographic History, 3rd ed., Jack L. Chalker and Mark Owings, Mirage Press (P.O. Box 1689, Westminster, MD 21158-1689), $75, 744 + xxviii pp. (ISBN:0-88358-204-X).
Books on Disk

When Iain M. Banks came out with *Consider Phlebas* and *The Player of Games*, he earned considerable praise. His vision of a distant future when one segment of humanity roams the stars in ships the size of small planetoids and in partnership with Minds—ultimate offspring of our own familiar computers—struck many as delightfully intricate, intriguing, and wondrous. At the same time, his "Culture" was something that perhaps only a British writer could produce. Humans seemed to occupy a position roughly analogous to the middle class, while the Minds provided both an aristocracy and a peasantry . . . But no, that's not it. Perhaps humans were more like the idle rich (though they worked), while the Minds were the bureaucrats who ran the society . . . But no, that's not it either. Yet even if we can't quite put our fingers on a proper analogy, it feels quite Imperial British, mannered and decadent and po-

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lite and despite a certain talent for mishap, really quite effective overall.

So you have some idea of what to expect if and when you pick up **Use of Weapons**. As the tale begins, the drone (a small, mobile Mind) Skaffen-Amitskaw is rousting the human Diziet Sma from her revels. There is trouble in the Voerenhutz cluster, and Sma must find Cheradenine Zakalwe, the man who has served her and the Culture before in military matters.

The remainder of the book presents Sma's search for and finding of Zakalwe, and then his attempt to settle the Voerenhutz difficulty, in chapters numbered 1, 2, 3, 4. . . , alternating with segments of Zakalwe's past, numbered XIII, XII, XI, X . . . The end result is sometimes confusing, but it does not take long for Banks to give us a picture of Zakalwe as a supremely competent tactician with a phobia about chairs. He grew up on a non-Culture world with two sisters and the son of a family friend. The friend was more talented than he at military matters, a sister learned carpentry and made chairs, and he once caught the other sister and the friend *in flagrante delicto* on one of those chairs.

How did he come to serve the Culture? That came later, after the friend turned into a monster and destroyed everything. After Zakalwe fled to fly in someone else's war on a frozen world, to utter words that angered his officers, to be cast out on the ice to die. That was when Sma first appeared to him, to offer healing and employment if he would only fight for the Culture wherever it sent him, no matter whether right or wrong (though the Culture must be the Good Guys, since it at least always needs excuses for what it does). Thereafter he served the Culture well, and in time he retired to pursue his own vision of good (though that vision was severely flawed).

And now Sma wants him again. His reward will be ample, in cash and—dare he think it?—in reunion with the long-lost, surviving sister. And at the apex of the book, that reunion reveals long-buried truth the reader has not suspected in the least. Banks is very, very good at misdirection, and I refuse to say more for fear of spoiling the story for you.

What I can say is that Banks's theme is less the use of weapons than the use of people, or the use of people as weapons. The Culture, for all its glories—one of which is that it can see things (the Minds) as people—sees people as things and uses them accordingly. Is that wrong? Well, we're raised to think so, but that doesn't stop us. As intelligent beings, we are manipulators of our environment, and other people are quite definitely parts of that environment. Of course we use them. Banks suggests that our saving grace is that we don't know or admit to ourselves that we do, and we therefore need no excuses. Thus needing excuses is a sign of the Bad Guys.

But wait . . . Consider the madly innocent doctor who like a birthday magician brings his machine to parties and gives the guests quaintly rococo wounds and splices body parts with no more excuse than opportunity. Is he good or bad? Or is one incapable of being labeled either until one accepts the need for excuses and considers just which excuses one chooses?

In a phrase, Banks is artfully ambiguous. He's well worth reading too.

As you might expect of a past *Analog* editor, Ben Bova is a very *Analog*ical writer. His tendency is to hard SF, meaning great care not to contradict what science knows (or thinks it knows)

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about the cosmos. He gives more attention than do some hard SF writers to human dynamics, but a great deal of his and his characters' passion does go to technical matters.

Such summary comments apply quite well to Ben's latest novel, **Mars**. After years of lobbying, Alberto Brumado has finally persuaded the world's nations to get together and mount a single manned voyage to Mars. Many young people, including his daughter, biologist Joanna Brumado, and the half-Navaho geologist Jamie Waterman, are in training, knowing that only a few will be chosen for the journey, as much for political reasons as for their skills. As the launch date nears, Jamie comes to believe that he has been passed over. But one geologist falls ill. Joanna leads a rebellion against another. And Jamie is in. He happily leaves his ambitious journalist lover, Edith, behind as he embarks for the Red Planet.

What does he find there? Almost, nothing, for on landing he ignores the little speech scripted for him by NASA's flacks in favor of a scrap of Navaho. The ensuing ruckus nearly gets him yanked back to the Mars-orbiting portion of the mission. But he weathers that long enough to make the trek to Tithonium Chasma, where he finds unusual warmth, water vapor, and—nestled in a crack in the canyon wall—an arrangement of rocks that reminds him of the cliff dwellings he knew in Arizona. He *knows—everyone* knows —that this is surely coincidence. But he insists that the all-holy mission schedule be rearranged to permit a return to the site for a better, closer look. He desperately wants to know whether those rocks are really ruins. He also pushes the idea that warmth and moisture make the canyon the most likely place to look for life.

Unfortunately, by the time he succeeds in his lobbying, that portion of the expedition on Mars is falling ill. Is it a disease? One from Earth? Or Martian? But there have been no signs of life! Then what is it?

The answer does not depend on whether there is life on Mars (no, I won't tell you what the explorers find in Tithonium Chasma). Nor is it the surprise it might have been. The tale thus has a certain fundamental weakness, but it remains quite readable. It also leaves enough questions unanswered to provide room for a sequel.

Orson Scott Card's latest looks like the first installment in his own personal Pentateuch. I say this deliberately, for **The Memory of Earth**, the first volume of his new five-volume *Homecoming* series, is Card's most explicit attempt to date to discuss, in a science-fictional idiom, the relationship between human beings and their God. There are other echoes as well of the first five books of the Old Testament, from an Eden guarded by an angel with a fiery sword to the tale of Joseph and his abusive brothers to the story of Moses.

Thirty or forty million years in the story's past, nuclear war (the fiery sword) virtually destroyed Earth. The few survivors fled, leaving the Earth in the care of a robotic Keeper (the angel), and settled the world of Harmony, where they built the orbiting supercomputer, the Oversoul, to foster peace and harmony partly by blocking from their minds all thoughts that might lead to technologies of mass destruction. The result is a culture that has electricity, computers, lasers, artificial gravity, and other marvels, but no wheeled vehicles, no airplanes, no radio. The inconsistency is workable only because of the Oversoul's thought control. On the

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other hand, the Oversoul clearly can't reach and control everyone. How the situation could possibly have lasted so long is thus so baffling that I suspect Card of turning into one more of that vast army of tract writers who erect strawmen, overstate their significance, and then, with much theatrical grunting and straining, destroy them.

Be that as it may, now the Oversoul is wearing out. Its control is weakening, which shows in rediscoveries of horse-drawn wagons and wars of conquest. It must restore the long-banned technologies to the humans of Harmony so that they may return it to Eden—er, Earth, of course—for repair. It therefore sends a vision to Volemak, the Wetchik, a chieftain of the people whose women live in the city of Basilica. Volemak prophesies future disaster, but few listen in a city whose political climate is dominated by schemes and debates related to a coming war. Volemak's youngest son, Nafai, hears the voice of the Oversoul still more clearly and learns of a plot to destroy his father. He cries warning, and he, Volemak, the crippled son Issib, and the two scheming brothers, Elemak and Mebbekew, flee to the desert. Later, the brothers return to Basilica to obtain the Index to the Oversoul, a device that allows access to the computer's vast memory banks, from the very man who was plotting to destroy their father. They fail, and Nafai escapes the city only when a woman leads him to the mystic lake at the city's core, where he passes through the water in a low boat. And if this makes one think of a babe in a basket, among bulrushes, discovered by Pharaoh's daughter, that is surely deliberate.

The failure of the mission nearly gets Nafai killed by his oldest brother. But then the Oversoul speaks aloud—almost as if from a burning bush—and names the boy its spokesman. It then promises that a second attempt for the Index will succeed, which it does. Soon thereafter Nafai—and Nafai alone—knows what the Oversoul needs done. Others hear messages much more in line with Card's biblical model.

You know from past reviews that I tend to like Card's work. I have no objection, either generic or sectarian, to his use of religious themes. Indeed, I admire him for the immense and subtle skill he has shown in his use of those themes.

I did not like this novel. Part of the reason is that I thought it far too heavy-handed—too strident, if you will—in its mimicry of scripture. Part is the anti-rational message that there are times when the best thing a human being can do is to turn off the mind and let outside forces—gods or oversoul—guide the action. Part is that *The Memory of Earth* simple did not come to life as effectively as Card's Alvin and Ender (and other) stories.

I cannot help but hope that later volumes in the *Homecoming* series will be up to Card's usual mark. If they aren't, then we must hope the series is only a temporary aberration.

Piers Anthony says that in 1971, he had eight unsold novels. Of the eight, one remained unsold until he got rich and famous, found a little time, and revised the tale to come up with **Mercycle**. I strongly suspect he would have done better by his reputation if he had left it alone.

The plot rolls right along, just as we're used to seeing from Anthony. The trouble is that it rolls like a bicycle with square wheels. It clunks.

The premise is that in a multiverse of zillions of parallel Earths, many are threatened by disaster (of an implausi-

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ble form unspecified until the end of the novel). Aliens have dedicated themselves to saving as many worlds as possible and are using a host of methods, trying them one by one, in countless variations, until they find an approach that can work. The method under trial on our Earth is to recruit a Minoan archeologist, a bald lady, a bicycle-tour scout, a physicist, and a geologist to be treated in such a way that they exist in some fashion between parallel Earths. In the "phase," they can go where there is water on this world but air on another. They extract their oxygen from the water, but they have dry-land-type freedom of movement. Indeed, the vehicles they use for traveling about the floor of the Gulf of Mexico are bicycles.

What are they doing under the Gulf? The alien plot is to get the group to "meld," to become a cooperative unit that can be told a secret mission. To encourage this development, the alien among them (there is also an incognito government agent) arranges "challenges" such as tainted food, missing supply depots, sunken cities of Minoan design but far more ancient than Minos's realm, a Minoan ship with a cargo of pottery tablets that reveal the secret of Atlantis, and even a colony of Chinese mermaids.

Sadly, Anthony never gets it all together. The tale clunks every time it hits one of the many expository lumps the author dropped in the road when he stopped to expound on the color changes and sizes of squid, the glory of coral reefs, and the proper way to ride a bicycle (among other topics), or to translate the Minoan tablets. The reader never identifies with the characters and never gets absorbed in the tale.

Zach Hughes's **Mother Lode** is a rapidly moving space opera that is not weighted down by any excess regard for reality.

The heroine, Erwin Penner, has just returned from a years-long voyage of interstellar exploration to find her father dead and his house and lands mortgaged to the hilt to buy a spaceship equipped for mining. In the ship's computer she finds a map to a distant sector of space, past the mysteriously destroyed Dead Worlds, where an asteroid belt contains much gold ore of astonishing richness. Naturally, she ups ship and fills her holds with treasure. She also finds a very human skull embedded in an asteroid and refrains from telling the authorities because they would seal off the system and keep her from getting suitably rich.

When she sells her gold, she arouses the greed of the buyer, who sets minions on her tail. She returns home, picks up a male partner, and returns to the gold field, where they manage to destroy the minions and discover another skull, this time attached to a skeleton with wings. The discovery resonates for a culture whose sole surviving piece of Old Earth literature is the Bible. Unfortunately, the angel is of the fallen variety, mad and evil and immensely powerful. Fortunately for Erwin, her partner, and humanity, its powers are less than they were before its world was destroyed.

It is a tradition of space opera to give superpowered evil aliens (and other villains) flaws so that the weak but clever human heroes can defeat them. Many authors, like Hughes, reveal the flaws only at the last moment, thus prompting the alert reader to wonder whether those flaws were invented only to let the authors get their heroes out of their fatal jam. And of course they were, even at the cost of making the reader wonder how anyone could have thought the vil-

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lains so superpowerful.

As hinted in my first line, however, Hughes's story has a greater weakness: Its reality testing is so poor that the thread suspending our disbelief above the abyss parts with a twang, as in this passage on page 11: ". . . the smell of the air . . . was no smell. No scents, no flavorings, only an exhilarating keenness and a feeling of clean purity . . . On Xanthos, where industry was prohibited [even though] the planet was one huge city."

Gene Wolfe calls **Storeys from the Old Hotel** "a collection of some of my most obscure work." The stories date as far back as 1967's "Trip, Trap," a science-fictional retelling of the troll-under-the-bridge fairy tale which, for all its cleverness, does not quite convince (from *Orbit 2*). They are as recent as 1988's "Alphabet," in which a prehuman pet tries to convince his alien master that he too can write (from *Fiction International*). Among them are two Sherlock Holmes pastiches, "Slaves of Silver" (from *Galaxy*, 1971) and "The Rubber Bend" (from *Universe 5*, 1974). Most sources, for all the vaunted obscurity of the stories, are familiar; the *Orbits* and *Universes*, the magazines *Galaxy* and *If, Amazing* and *F&SF, Isaac Asimov's SF Magazine* and even *The New Yorker*. Most of the thirty-four stories are short, making the book ideal for dipping into at bedtime or while traveling. The shortest, indeed, are four he composed while on a 1981 train trip from Chicago to Seattle and back; one is the title story, and it appears here for the first time.

It is tempting to say that the stories Wolfe presents here are instantly recognizable as his work. There are his distinctive elegance and polish and the cool distancing of a seasoned observer of life and literature. However, it is almost always possible to find writers who share what we might consider the distinguishing features of any one writer's style. Two who come to mind at the moment are Avram Davidson and—to mention one reviewed earlier in this column—Iain M. Banks. Yet both are rarely as cryptic as Wolfe often is, and neither could ever be likened to a good-humored Buddha.

Whether you consider Wolfe *sui generis* or not, you'll enjoy a visit to his old hotel.

Robert A. Heinlein is gone. His memory lives, however, and many of those who hold it dear wish to do the man honor. Thus we have **Requiem: New Collected Works by Robert A. Heinlein and Tributes to the Grand Master**, edited by Yoji Kondo and with a preface by Virginia Heinlein. The "Works" include the title story, in which D. D. Harriman finally reaches the Moon. There is a Boy Scout story, "Tenderfoot in Space," and a never-before published girls' story, "The Bulletin Board." There are both the original "Destination Moon" novella which became a movie and the piece he did on "Shooting *Destination Moon*." There are guest-of-honor speeches. There are the proceedings of the National Air and Space Museum Heinlein Retrospective of October 6, 1988, when Heinlein received the NASA Medal for Distinguished Public Service. Finally, there are the "Tributes": memoirs by Poul Anderson, Jim Baen, Greg Bear, J. Hartley Bowen, Jr. (Heinlein's WWII supervisor at the Philadelphia Navy Lab), Arthur C. Clarke, Gordon Dickson, Robert Silverberg, and Jack Williamson; a story by Larry Niven; a rousing cheer and a song from Spider Robinson; a "Thank You" from Harry

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Turtledove; and a last farewell from the editor and Charles Sheffield.

The whole is a poignant reminder that no matter how much we love our favorite writers, no matter how much they have contributed to the fields of literature, no matter how many stories they have inside them yet unwritten, they do pass. Bid the master *ave atque vale*, and then thank whatever gods there be that those fields of literature are ever green. We meet new writers every day, and surely we will someday call some of them masters to equal any of the past.

Here's one for collectors, scholars, and all libraries with serious SF collections. It's the third edition of Jack L. Chalker's and Mark Owings's **The Science-Fantasy Publishers: A Critical and Bibliographic History**. The preface begins by claiming that "There are *blanks* in this book!" for though the authors have tried to be accurate in their recitation of bilbiographic facts, the essential records have sometimes been lost. The authors then spell out their mission, which they say stirred some controversy when the *History* first appeared in 1966: They have tried "to present the science-fantasy small press in the Twentieth Century in its rightful and yet usually unperceived historical context . . . creating a *gestalt* system . . . an account of people . . . never . . . coldly objective . . . a collection of love stories." This then, as expressed in essays on each of many genre small presses, is the "critical" in their title. The "bibliographic" refers to their listing of the small presses' offerings with brief descriptions.

Well worth noting is the authors' effort to ensure that the book is as up to date as possible: My copy arrived with an "Errata and Addenda" sheet and a promise of more on request, with an annual *Supplement* chapbook scheduled.

BOOKS ON DISK

James T. Henry III writes from 405 Gardner Road, Stockbridge, GA 30281-1515, that he is joining the disk-top publishers' brigade by making available on 3.5-inch disk Lewis Carroll's "The Hunting of the Snark" (for $4) and Leo Tolstoy's "The Tale of Ivan the Fool" (for $5). He adds that these stories should be available soon from PC-SIG, Public Software Library, and CompuServe, that he is busily typing into his computer Rudyard Kipling's *Just So Stories*, and that he plans to tackle Hope Mirrlees's *Lud-in-the-Mist* next. He then wishes to branch out from public-domain materials by publishing some of Murray Leinster's stories; he is trying to get permission from the Leinster heirs to do so.

He didn't send samples, so I can't comment on the quality of his typing or of the user interface he's providing. I can say that he seems to be describing his distribution arrangements optimistically. He says he has mailed the first two disks to PC-SIG, Public Software Library, and CompuServe, which sounds rather like a wannabe author claiming success as soon as he has put his first story in the mail to Stan Schmidt—long before Ye Editor has read it, much less bought it or published it.

Ah well. He definitely has one thing going for him. Rather than publish material by unknown authors who have already proven unable to find a print publisher, he's putting out time-tested classics. If he succeeds and if his list grows big enough, then we might one day have available on a single laser disk, and hence searchable for characters, gimmicks, concepts or other tag-ends of memory, all the science fiction pub-

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lished before Gernsback, or all the SF from Gernsback to 1950 (including the entire Golden Age), or everything from the New Wave, or . . . Take your pick, and think how useful such things would be to students, scholars, and fans.

Is Mr. Henry worth encouraging? *Someone's* going to make all this stuff available, and it might as well be him. ■

IN TIMES TO COME

●Next month we begin, with a bang, a new four-part novel by Kevin J. Anderson and Doug Beason: *Assemblers of Infinity.* What do you do when you discover that *something* is being built on our Moon—but you have no idea what it is or when it will be finished, and there's no sign of anybody doing the work? All you know, and you know that quite positively, is that it's very, very dangerous. Getting the answers immediately becomes a top priority—and answers like those have a way of leading to even bigger questions. . . .

Our September issue also offers a wide variety of stories by such writers as Grey Rollins, Alexis Glynn Latner, Martha Soukup, and Brian C. Coad. Arlan Andrews's fact article, "Manufacturing Magic," sounds like it has a lot in common with *Assemblers of Infinity,* but the principle is not quite the same. What Andrews describes is a lot closer to home—various versions of it are already operational in several labs—but it *does* look like magic.

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brass tacks

Dear Stan:

Judging from the two letters in the December 1991 Brass Tacks about your "Say When!" editorial of February, *Analog* must have some weird and wonderful readers. Genocide? Abortion? I certainly didn't remember anything quite that dramatic when I first read it, so I went back and read it again.

Starting from your concern about reducing the rate of population growth and ending up screaming "Genocide!" is certainly an example of the "extrapolatio ad absurdum" concept you spoke of in your May 1990 editorial.

The abortion discussion reminded me of "The Limits of Tolerance" editorial of October, 1989. Tolerance ends when one religious group or another attempts to pass laws that would prevent those who have other beliefs from practicing their religions. Abortion is divisive because different religions have conflicting views on this issue.

Religions in general, including Christian religions, can be characterized as being either "status" religions or "process" religions. Status religions show great concern for what state a person is in. One is either saved or not saved, in a state of grace or not in a state of grace; and someone who has been "born again" is seen as a different person, in some quintessential way, as a result of the experience. Process religions, in contrast, see a person's religious life as a continually developing process, the gradual accumulation of knowledge and experience about spiritual matters that goes on throughout one's lifetime.

When it comes to the question of "humanness," those who believe in status religions would look at this in terms of what state one is in and when did it come about. Focusing on man's biological beginnings, they conclude that a human being comes into existence

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"full and complete" and this occurs "all at once" at conception. Those who believe in process religions would look at "humanness" in terms of man's spiritual nature, one's unique ability to form a special relationship with God. This relationship is based on the one a baby first has with mother, father, and others, and grows from there in a process that continues throughout life. Since humanness relates to spiritual development, to ask exactly when a person becomes human makes no sense. There is no magic moment when this occurs; becoming fully human is a process one goes through, not a state one is in.

These two religious frames of reference yield different answers to life's most important questions. Say a loved one is in a persistent vegetative state and is being maintained on feeding tubes, and so on. Relatives from a status religion would take the physical presence as proof that a human being is there, so ending life support would not be allowed.

Relatives from a process religion would maintain that when the person lost the ability to interact with others, the ability to relate to God ended as well. True, the body is there, but the human being they knew and loved is already gone, so ending life support would be appropriate.

Clashes between these two points of view were discussed in your January 1991 editorial, "Your Rights, Whether You Want Them or Not." When it comes to abortion, those who believe in status religions would say that there is a tiny human being involved, so abortion would be wrong.

Those who believe in process religions would say that being human is based on a relationship with God, and any relationship first requires that one be a unique and separate individual. This condition exists only after birth, not before, so terminating a pregnancy would be acceptable.

Some believe that having a child is life's greatest joy, and feel that any woman would be more than happy to have one. A law that would force a woman to have an abortion against her will would be immoral. Others believe that raising a child is life's greatest responsibility, and that a woman would be remiss to have a child she was unable to care for. Any law that would force a woman to bear a child against her will would be immoral.

Out of respect for the moral concerns represented by these two religious views, we must make no law that would force a woman to do either.

I hope that we can all appreciate the religious diversity that exists in America and be more tolerant of the religious principles and practices of others. In the final analysis, it is not your beliefs or my beliefs that really matter, but rather the religious beliefs of the people who are faced with these agonizing decisions that must prevail in every instance.

In any case, I always find your editorials sparkling. You can tell by how well I've remembered them! If I have tickled your synapses, there's no telling where that might lead, but I'm sure we will all enjoy the excursion.

WILLIAM J. WARE

Spring City, TN

Dear Dr. Schmidt:

I'm pleased that the story "A Calendar of Chaos" (December 1991) contains some favorable comments concerning my favorite composer, Franz Josef Haydn (1732-1809). However, I find it somewhat surprising that, in doing so, the author failed to mention the one piece of this composer which would

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be most appropriate for a story whose plot is based on the concept of "chaos." One of Haydn's greatest masterpieces, his oratorio *The Creation*, begins with a long orchestral description of the state of disorder which preceded the creation of the Universe—when, in the words of the Book of Genesis, "the earth was without form and void." The title of this opening section? *The Representation of Chaos.*

HENRY STRATMANN, M.D.
4903 Southridge Park Drive
St. Louis, MO 63129-1795

Sir:

I first started reading *Astounding* in the 1940s while a student, and to say Mr. Campbell had an influence in my life would be a mild statement. I have never written before, probably because I never felt pushed. But now I am.

The story *Glass Houses*, by Laura J. Mixon in the December issue, has driven me to the point of writing. The first thing that bothered me was the use of "I-he" and "I-Golem" etc. It seemed to me it would be easier to use the "we." But what really got to me was the lesbianism. Don't get me wrong, I'm not a prude, *but* when I read science fiction I am not looking for the sociological problems I can get in my daily newspaper. I know and have known many homosexuals both male and female. But that does not mean I want to read about them in my science fiction.

My wife and I compared favorite authors one time and much to our surprise we found out that she read female authors and I read males. You have published female authors in the past and some have been all right and some have not been my cup of tea. But when I find a story upsetting I get upset and that is not what I pay for. I tried to be fair and read the complete story, and my final comment was that it was dumb, and the worst thing is that I felt it was a waste of time.

As a customer of yours there is only one thing I can do when I am offended, stop buying your product. After all these years I would hate to do that.

CHARLES MONTERO
Huntington Beach, CA

I'm always interested in your comments, and I'm sorry you didn't like Glass Houses. *However, many other readers did, and I have to listen to their comments, too.*

One of the fundamental problems of editing a magazine with 100,000 or so readers, all with highly individual tastes, is that I can't possibly please all of them with anything or any of them with everything. If you found a lot *of what we were doing offensive, I'd agree that dropping us would be an appropriate response. However, if it's only an occasional something, I respectfully suggest that a better approach would be to stop reading the particular pieces that bother you, and let me know—as you have done.*

Meanwhile, I hope you'll continue to enjoy the magazine most of the time—and to let me know when you don't!

Incidentally, "we" is not really the same thing as "I-he," and I can easily imagine that the latter is a new form that might well become popular if and when telepresence does.

Dear Dr. Schmidt,

Thanks for two great issues in December, and most especially thanks for the outstanding science article: "Protecting Humans from Ionizing Radiation in Space" by the Dorns in the Mid-December issue. In addition to being a straightforward, easy read, this article

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had an excellent bibliography and more useful meat than many survey articles I have seen in technical journals. I would particularly like to commend you for allowing the authors to include equations in their article. For anyone with a working knowledge of high school math and a computer program, such as a spreadsheet, that can use simple equations, these are worth a thousand words each. This article was a gold mine of useful information for those of us reading and writing about the high frontier and for those with an interest in radiation safety in general.

I thought it might be helpful, also, to publish the shield volume equations in a more general form for those of us who might want more than two meters of shielding, or want to consider shielded space colonies with length-to-radius ratios of other than ten. One should also note that the end caps on the cylinder are flat disks, rather than the hemispheres used for Clarke's RAMA. In general, when r is the radius of the enclosed volume and t the thickness of the shell, for spherical colonies:

$$V_{shell} = 4\pi(t\,r^2 + t^2 r + t^3/3)$$

and for flat-ended cylinders where L is the length of the enclosed volume:

$$V_{shell} = 2\pi(t\,r^2 + 2\,r\,t^2 + t^3 + L\,t\,r + L\,t^2/2)$$

These will give you the Dorn equations on page 43 if $L = 10\ r$ and $t = 2$.

I would like to contribute two additional observations with respect to mass shields. The first is that the shield does not have to rotate with the interior, and in fact could be detached to rotate coaxially in the opposite direction, using magnetic bearings to ensure spacing. This would reduce stress and give the system zero net angular momentum, making it easier to reorient, should that be desirable. The second observation is that because of the cube-square rule, the mass of a two-meter shield becomes a negligible fraction of the whole mass if the system is large enough: RAMA size, for instance.

GERALD D. NORDLEY ■

●He knows nothing; he thinks he knows everything—that clearly points to a political career.

George Bernard Shaw

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a calendar of analog upcoming events

17-19 July
PHROLICON 8 (Philadelphia area relaxacon) at Mt. Laurel Hilton, Mt. Laurel, N. J. Guest of Honor—Esther Friesner. Registration—$20 until 4 July; $25 at the door. Info: Phrolicon 8, Box 42195, Philadelphia PA 19101-2195. (215) 828-4566.

29 July-2 August
ECUMENICON V (Feminine Aspects of the Divine) at Holiday Inn-College Park, College Park, Md. Guests include Otter & Morning Glory Zell, Jacqueline Lichtenberg, Jane Sibley. Registration—$50 at the door. Info: Ecumenicon Foundation, Box 249, 15106A Frederick Road, Rockville MD 20850.

31 July-2 August
RIVERCON XVII (Louisville area SF conference) at Hyatt Regency, Louisville, Ky. Guest of Honor—Mercedes Lackey; Art Guest of Honor—Douglas Chaffee; Fan Guest of Honor—Laurie Mann; TM—Bruce Pelz. Registration—$18 until 15 July, $25 thereafter. Info: Rivercon, Box 58009, Louisville KY 40268-0009.

7-9 August
HORRORFEST 4 (Horror-oriented conference) at Chicago, Ill. Guest of Honor—Joe Citro; Editor Guest of Honor—Darrell Schweitzer. Info: Horrorfest 4, Box 277652, Riverdale IL 60627.

17-24 August
MYTHCON XXIII/J.R.R. TOLKIEN CENTENARY CONFERENCE (mythopoeic conference) at Keble College, Oxford. Info: Tolkien Centenary Conference, % Lynn Maudlin, Box 394, Altadena CA 91003 or Pat and Trevor Reynolds, 16 Gibsons Green, Heelands, Milton Keynes MK13 7NH, England, U.K.

3-7 September
MAGICON (50th World Science Fiction Convention) at Orange County Civic & Convention Center, Orlando, Fla. Guest of Honor—Jack Vance; Artist Guest of Honor—Vincent Di Fate; Fan Guest of Honor—Walter A. Willis. Registration—$110 adult/$55 child until 15 July 1992; $135 adult/$75 child at the door. Supporting—$25. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition—the works. Join now and get to nominate and vote for the Hugo Awards and the John W. Campbell Award for Best New Writer. Info: MagiCon, Box 621992, Orlando FL 32862-1992. (407) 859-8421. UK agent Peter Weston, 14 St. Bernard's Road, Sutton Coldfield B72 1LE, UK.

29 October-1 November
WORLD FANTASY CONVENTION at Callaway Gardens, Pine Mountain, Ga. Guests: Anne McCaffrey, Michael Bishop, John Farris, Martin H. Greenberg. Limited membership. Registration—$100 in advance; NO at-door memberships. Info: World Fantasy Convention 92, Box 148, Clarkston GA 30021. (include SASE)

You can send me e-mail about your convention—A.LEWIS20 on the GEnie™ network.

—Anthony Lewis

Items for the Calendar should be sent to the Editorial Offices six months in advance of the event.

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SPACE AGE SPEAKER

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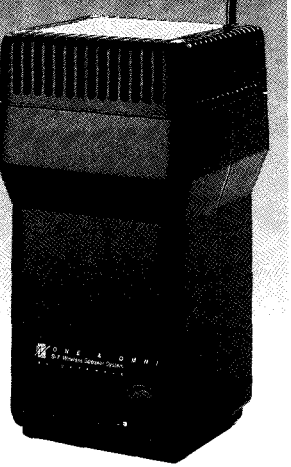

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